Trans. Inst. Indian
Geographers

Dynamics of the Peri Urban Interface: Issues and Perspectives for Management

Sayantani Sarkar and Sumona Bandyopadhyay, Kolkata - W.B.

Abstract

The peri urban interface is a complex region in itself, being transitional in nature and characterized by neglect, especially in the developing countries. Being neither urban nor completely rural, it falls beyond the purview of planners on either side, but continues to host the spill-over population from the urban vicinity, albeit without necessary infrastructural support. Land in the peri-urban interface is of vital importance as the region is impacted by a lack of clarity in land use planning and policies, while being a part of the city's hinterland, which has its typical economic as well as ecological role in the sustenance of both the urban and rural zones. This paper attempts to discuss the key perspectives of the peri-urban interface in order to assess its planning needs. Subsequently, the paper proceeds to provide empirical evidences of two major aspects of management, namely the economic and ecological relevance from the planning perspective as the two core issues in the Indian context. An overview of existing literature on problems and issues of the peri-urban interface reveals that there is an acute lack of holistic understanding of the region as a link in the chain of transition from the urban to the rural landscape systems. The paper finds that understanding of the various nuances of the region is likely to broaden the planners' perspective for efficient resource utilization as well as livability of these transitional areas. Another key finding is that the need to formulate at least a broad framework of plans for the land use changes of fringe areas such that absolute haphazard development does not create irreversible losses to the human-ecosystem linkages.

Keywords : *Urbanism, peri urban interface, land use planning, economic perspective, ecological perspective livability.*

Introduction

An overwhelming volume of literature in urban studies revolves around the city itself. The city has been defined by many and in different ways. From the various definitions of the city, it is clear that the city is a spatio-temporal concept as well as a socio- economic one. Spatial, because it occupies a definite portion of the earth surface; temporal, because it has its own stages of development and socio- economic because it reflects a way of life and its unique framework of life and livelihood. It is perhaps this uniqueness that leads to an understanding of "urbanism". On the other side of the scale is the village which is more related to its immediate surrounding and more dependent on it for its survival and existence. Like the city, it has its own spatial and socio-economic characteristics. Though the city and the village, or in a broader sense the urban and the rural stand as antonyms, it cannot be denied that they are part of a common system and the two ends of a continuum. The city and the countryside together form the "city region"

and are functionally related, though having completely different economies and land use patterns. They have their own spatial expansion but when they meet, they form a completely unique region which is characterized by mixed land use and evolves as a different cultural entity as well. The dynamic nature of the city compels it to sprawl beyond its boundaries and in this way, it gradually engulfs the surrounding countryside and annexes them with its own territories. It is here that the urban meets the rural and forms the "peri urban interface".

Over time, there has been a gradual shift in research perspectives from scholars concentrating more upon the rural and the urban as separate entities, to their interrelation. At present, the nature of the peri urban region has become a key area of concern, due to its continuous neglect. This paper attempts to analyze the conceptual aspects of the peri urban interface and dwell upon its land management issues.

A Conceptual Framework

The term urban fringe was first used in 1934 by T.L.Smith in his study of population of Louisiana in which he referred to it as "the built up area just outside the corporate limits of the city". Smith considered the extension of urban morphology outside the administrative limits of the city. However, this definition has gradually become ambiguous, as, the extension of the urban built-up structure in the rural areas is quite common. The only difference that is visible in morphology may be the gradually lessening density of the built up structures as one moves outward from the core and secondly, the change in land use between the two. According to Mookherjee (1963), Smith's conception of the peri urban was based on the concentration of non- village, rural non farm population and the characteristics of land use outside the city limits. Land use along the city limits is evident of the change over from urban land use patterns to the rural. In other words, it can be considered as the termination of the urban land use, which is residential, commercial and industrial in nature, to rural, which is mainly agricultural. Wehrwein (1942), in his article "The Rural- Urban Fringe" defined the region as "…the area of transition between well recognized urban land uses and area devoted to agriculture". This change over is characteristically zonal i.e. it extends for a distinct region where this transition is visible in the form of mixed land use. The peri urban has been referred to as having "mixed spaces" (DuPont, 2005) being "mid way between urban centres and rural spaces". However, these "mixed spaces" are not static, rather, are dynamic due to the gradual sprawling nature of the city. The extension of the city along its periphery often compels one to define the peri urban as not areas where urban and rural land uses co exist but as areas where the urban economy gradually engulfs the rural. Andrews (1942) defined urban fringe as the "active expansion sector of the compact economic city" and to him, the periphery of this urban fringe is the "rural- urban fringe". It is very much evident from the fact that along the fringes of the city the agricultural land is taken over for urban purposes. Thus the peri urban interface is evident of the gradually losing rural aspects due to the growing autocracy of the city or the urban.

Due to its location between the two extremes, the peri urban is of a unique character which is neither truly urban nor totally rural. Rodehaver's (1947) definition

of urban fringe is "the interstitial area which lies between an urban unit and its outlying rural-farm areas." Along this interstitial area the economic activities change and this change bring about further changes which are social, cultural as well as demographic in character. As Pryor (1968) points out "The rural urban fringe is the zone of transition in land use, social and demographic characteristics, lying between a) the continuously built up urban and suburban areas of the central city and b) the rural hinterland, characterized by the almost complete absence of non farm dwelling, occupations and land use, and of urban and rural social orientation……".

It is this unique nature of this region that arouses the interest of the scholars in research and analysis of its various aspects. Literature abounds, and according to Pryor (1968), there exists two characteristics of the literature on the peri urban "…. of the last 30 years:

- "The general absence of explicit references to the subject outside North America……."
- "The confusion of terminology and lack of clear delineation in case studies……"

Here it must be mentioned that the concept of fringe holds different meanings in the developed and the developing countries of the world. In the former, the fringe areas are becoming the most preferable areas of residence for the higher income urban groups. In most of the cities of the developed world inner city decay has long set in and the since then, the trend is of suburbanization i.e. moving towards the outer peripheries. Thus the suburbs form the outer part of the urban built up residential areas. Although the concept of peri urbanization comes close to that of suburbanization, it is difficult to equate them. It can be stated that the concept of peri urban interface belongs to the newly urbanized countries of the Third World, mainly Latin America, South East Asia and Africa. The urban growth in1975-2000 was mainly concentrated in these third world countries and as such the haphazard pattern of urbanization and the unplanned migration resulted in to emergence of extensive peri urban interface regions (Simon, 2008).

As opposed to the well planned suburbs of developed countries, the peri urban interface of developing regions often lacks the fundamental urban infrastructure and the basic urban amenities. As a result, the residents of this region, whether the higher or lower income groups, face some common problems. The higher income groups still manage to solve the problems by spending some extra money but the peri urban poor fail to do so and thus fall as the victim of circumstances. According to Kundu et. al (2002) in India, the suburbs are "degenerated periphery", while in the U.S.A. the suburbs are rich and powerful and in France the suburbs are transitional zones composed mainly of the middle class and the poor groups in uneasy competition (Jargowsky, 2005).

In the Indian context, rural urban fringe can be designated as starting from the point "where agriculture land- uses appear near the city and extends up to the point where villages have distinct urban land- uses" (Ramachandran, 1989). As such, the peri urban interface is the zone of mixed land use where people are still engaged in agriculture. The type of cultivation carried out mainly is horticulture, to fulfill the daily nutritional requirements of the city. Besides horticulture, dairy farming and aquaculture

are also practiced in the peri urban interface areas. Another important criterion for the peri urban interface is the daily commutation of the residents to the city mainly for occupation. This is an indication of the gradual degeneration of the rural activities and the increasing tendency of the urban activities. This rural-urban interaction is interlinked with economic, social and cultural transformation and that these flows and linkages can be divided into three broad categories: the global, the national, and the local levels. The environmental nature of these interactions is also important as "the urban residents and enterprises depend for basic resources and ecological on an area significantly larger than the built up area" (Tacoli, 1998).

As Pryor (1968) considered the rural urban fringe areas as residual zones lying between the two extremities- the rural and the urban, there is a transition encountered. A region which was initially rural comes in close contact of the growing city and gets converted into a transitional area and finally gets annexed to the city as an urban area. Also newer peri urban areas emerge. Ramachandran (1989) has divided growth of this fringe area into 5 stages:

a) The rural stage, i.e. when the villages remain unaffected by the city.
b) The stage of agricultural land use change, i.e. when the impact of the city is felt with the initiation of functional relation between the city and the village.
c) The stage of occupational change, i.e. when the employment opportunities of the city attract the village people. They set forth toward the salaried jobs and form a greater part of the informal sector of the city. This change in the occupational pattern also leads to setting up of better communication between the city and the village, which was initially restricted to bicycles or other slower modes of transport. Thus commutation is introduced.
d) The stage of urban land use growth, i.e. village agricultural land now slowly starts getting used up for residential purposes. The real estate agents enter the villages, allure the villagers and buy their fertile land to convert them to residential areas. Land prices start soaring and the socio-economic profile of the region gets altered.
e) The urban village stage, i.e. when the entire agricultural land has been converted to residential area and farming as an occupation is dissolved. It no longer comes with the fringe zone and is surrounded by urban land use.

Therefore the peri urban areas are dynamic areas but the lack of proper planning of these areas result in the degeneration of rural villages into urban slums and squatters. The serenity and sound culture of the villages gets lost and these become the breeding places of economic, social and environmental problems. Allen (2003), therefore, defines peri urban interface as an "uneasy phenomenon" characterized by "loss of rural aspects" and "lack of urban attributes".

The peri urban interface is thus an area of transition where the urban and the rural meet as well as interact. It encounters a unique pattern of land use and is often designated as area of "mixed land use". Simons (2008) refers to these as "complex mosaics of juxtaposed activities previously regarded as incompatible" the concept of kotedesatie, meaning city villagization, has

emerged from this though which is used for areas where the urban and rural activities take place together. McGee has used this concept in his study, as Desakota in the Indonesian context. He has classified the Desakota region into three types:

a) Type One: with regions showing decline in rural lifestyle, land use and increased dependency on urban centres.

b) Type Two: where the population has shifted to the core region

c) Type Three: which are regions of slow economic growth around secondary urban centres

The Problem of Delineation of the Peri Urban Interface

Theoretically peri urban interface has been highlighted as lying midway between the urban and the rural areas, practically it is difficult to designate the areas. As such different methods of delineation have been forwarded by different scholars.

First the political boundary between the city and the villages can be considered. Ganguly (1961) divides Kolkata fringe area into five statistical zones viz. the central city, inner fringe, outer fringe, mixed area and unincorporated areas. She has approached the fringe area from the administrative point of view. According to her, "although fringe phenomena occur spatially without regard to political boundaries, one way of understanding the fringe is by studying the administrative boundaries."

While defining the fringe of Kolkata, she has followed the below mentioned criteria:

a) Incorporated places with both urban and rural population of which at least must be engaged in non agricultural activities

b) Incorporated areas with a total population density of above 2000 persons per sq, mile, with at least an urban population density of 3000 persons and rural population density of 1000 persons per sq. mile.

c) Incorporated areas with a concentration of 1000 dwelling units or more with a density in this concentration of 500 units per sq. mile

d) There should be gradual devaluation of land from the centre to the fringe, and with it should be added the criterion of

e) Full city services ceasing to be available

However, considering only the administrative limits may not give the desired results. As, Wehrwein (1942), stated in his article, the built up city may not be coterminous with the political boundary of the city. The socio- economic city i.e. the area within which the people reside may extend beyond the city limits. On the other hand people following the rural lifestyle and engaged in farming activities may well be within the city boundaries. Therefore the fringe area "can be best identified in terms of land uses or modifications of land uses in than in any other way."

The limits can then be designated, taking into consideration the economic characters of the region, like the land use pattern and the occupational character.

Mookherjee while studying the Orlando and Florida urban fringe was concerned mainly with the analysis of the land use patterns and changes. Two main principles were employed:

- The use of the surveyed township section of 640 acres as a unit for boundary delineation purposes,

- The consideration of the intensity of urban land use or subdivided land as the basic criterion for determining the urban fringe.

Similarly, Rodehaver's method of fringe delineation of Madison was based on three factors viz, a) proportion of non farm families to the total number of families; b) the density of non farm families; and c) the assessed per acre valuation of buildings and land. Martin based his method on two considerations, a) location of single family residences out side the corporate boundary of the city and b) the presence of natural barriers as fringe boundaries. He drew the limit where the "patterns of land use characteristics of the fringe changed to the dispersed pattern of open country farming." The extension of urban services, like water supply and public transport mainly buses, can also be considered as a method of delineation of the fringe areas. Blizzard et al based their procedure on the extension city services.

However, the excessive dependence on secondary data for the delineation process may not give the true picture of the fringe. As Ramachandran (1989) pointed out, field survey is a must, to measure and draw the true boundary between the urban and the rural and hence recognize the peri urban interface. Different scholars have forwarded different measures around the city which can be regarded as the fringe. Simon (2008) says a diameter of 30 to 50 km around the city while according to Ramachandran (1989) it is 10 to 20 km radius around the city. However, the actual width and location of the interface keeps on changing with the gradual sprawl of the city (Simon, 2008).

Structural Content		**Functional content**	
Definition	Delineation	Definition	Delineation
Location	Census categories (direct or derived) e.g., non-village RNF, urbanized area minus central city Contiguous census units e.g., "first tier colonies" Non census areal units beyond control of central city e.g., school, voting districts. Selected parameters e.g., 500 sq. mile	Land use	Specific e.g., market gardens Mixed e.g., between limits of exclusively urban or rural land Valuation Changes Census categories e.g., RNF Commuting zone beyond central city boundary Rate of Growth per year or inter-censal
Administration		Employment	
Population density	Zoned mixed land use (rural and urban) Lack of subdivision control Selected parameters e.g., proportion in recent inter censal period	Population density	Area not served by specific services
Zoning Regulations		Utility services	Rural location, urban orientation of social activity Undergoing change e.g., increase in population density or vacant or urban land
Dwelling age		Social orientation	
		"Transition dynamism"	

(Source: Pryor, 1968)

According to Pryor (1968), "a rural urban fringe can only exist between a growing urban centre and its rural hinterland…." He tried to define and delineate the rural urban fringe in the following way.

His view states that these components, summarized above must be combined and integrated with the theories of urban invasion and with the practical delineation techniques.

Taking Peri-urban research forward

With the introduction of GIS (Geographical Information Systems) and remote sensing in the field of urban research, the quantitative measurement of urbanization has gained a new momentum. The classification of available satellite data accordingly can give excellent results of measuring the urban extension along with urban expansion in any region. Some of the common indices of classification are average built up area, average densities etc. The application of this new technology in urban fringe delineation has given very good results as well. Generally, an urban region is made up of a core and a surrounding suburban, peri urban and the countryside region. There exists a constant flow of goods and services between the core and the periphery. Therefore, none of the two can exist in isolation. However, structurally it is the tendency of the city to spread outward form the core into the countryside. This pattern of growth of the city and the shrinkage of the countryside can be monitored using the GIS. Such studies reveal substantial information on land use changes and land character.

Mention need be made of the study on Leipzig, Germany, where E. Banzhaf et. al. (2009) have monitored the changing patterns of the rural-urban continuum and studied the land use changes along with the social, demographic and economic changes related to it. In the peri urban context, Geographical Information System is used to detect the land use change, the extension of the built up area, the interaction between different land uses and the effect of land use on the natural landscape. Also the availability of satellite images and data of different periods has made it possible to compare the current land use with the historical ones. In Australia, nighttime satellite imagery has been used by Sutton et.al (2010) to study the sprawl and the associated peri urban development. The high light intensity areas are taken as urban while the low intensity areas are taken to be rural or of uninhabited wilderness. The combination of this data with the population data gives the population Fig.s of the respective areas. Such innovative ideas of the delineation and analysis of the urban and peri urban areas are possible due to the availability of these images and the application of the GIS and remote sensing techniques. In China, an integrated GIS based analysis system, IGAS, has been developed for scientific and efficient management of the urban lake areas situated along the fringes. The different methods undertaken include, land use suitability assessment, analysis of land use change, land evaluation and allocation of land use.

The "Hubli Dhadwad Baseline Study" project, utilizing the GIS techniques, produced some thematic maps and depicted the changes in the village populations and the number of landless people in the 25 villages surveyed. A number of similar projects were undertaken in Kumasi, Ghana, as well. GIS technique was used in delineation of agricultural land and proper utilization of the natural resources in the peri

urban interface region of the same. This new method is very much helpful in combining the archaic cartographic information with the recent. In order to study the changes encountered in the satoyama or natural agricultural landscapes of Japan from 1880 to 2001 the land use maps were created by selecting and scanning of a base year map (1961 topographical map in this case) and updating it using aerial photographs of current years. Old maps made by obsolete cartographic techniques, like jinsoku-sokuzu are referred to for correction. Somewhat similar methodology has been applied in the study of the landscape changes in the yatsu valleys in the southern Kanto region of central Japan for a period of 30 years. Likewise the analysis of land cover and land use of Morelia city of Mexico land cover patterns were interpretation sequential black and white panchromatic aerial photographs, corresponding to the city and its surroundings (Lopez et.al., 2001). Different methods like aerial photo interpretation, digitization, georeferencing and geometric correction were applied to generate desired results. Shu Li Huang et.al, while studying urban sprawl in Taipei-Taoyuan area (2009), have used the normalized differential vegetation index,

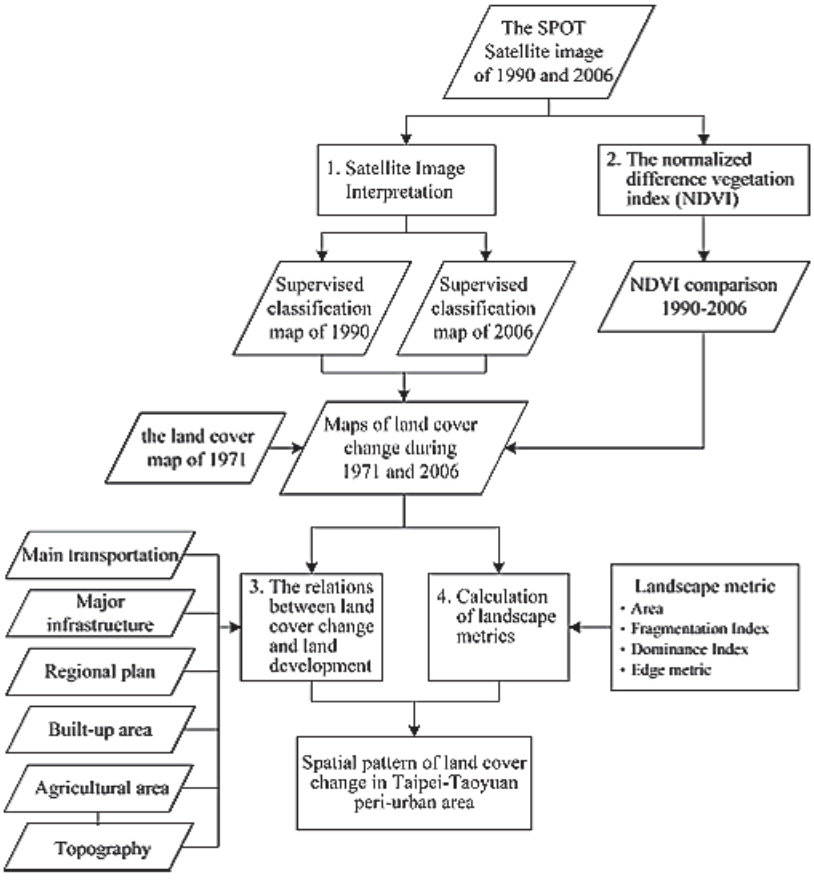

Fig. 2. The procedure for analyzing spatial pattern of land cover change in Taipei–Taoyuan area.

(Source: Shu Li Huang et.al, 2009)

for studying the land cover changes for different years. Comparing the mean NDVI values of different years, it is possible to identify the increase or decrease in the total vegetative cover of the area, as in case of Taipei-Toayuan there was a decrease in the vegetative cover from 1990 to 2006 (Shu Li Huang et.al, 2009).

The development of an Integrated GIS-based analysis system in China for "land –use suitability assessment, system analysis of potential land use change and demand and land evaluation and corresponding allocation for lake areas under urbanization" (Liu et.al.,2007) is also a good example of the same. These and various other applications of the remote sensing and GIS techniques in the field of peri urban interface are currently under progress. Thus the increased application of satellite data and GIS methods in the study of the peri urban interface makes it more scientific and close to reality.

Connotations of Land Management in Peri-urban Regions: Empirical Evidences in India

Primarily, the acute neglect and improper management may be contributed to the lack of information about this zone. Since the peri-urban regions are not clearly delineated, it remains outside the jurisdiction of planners who either concentrate upon the core areas, municipalities or make all pervasive broad outlines for the metropolitan region as a whole. Also, planners tend to reveal an urban bias. Peri urban interfaces are often referred to as area crying out for attention (Narain and Nischal, 2007). The lack of attention has lead to severe mismanagement of the natural resources of the interface region.

Land use Change and the Economy

As mentioned earlier, the urban planners have a strong bias towards clearly defined urban zones. The setting up of edifices is almost a visual declaration of development in any region. This is partially true for the peri urban areas as well. As the city slowly progresses towards the rural country side, it gradually transforms the nature of the countryside. In the name of development, strategies are laid out for extension of roads, building flyovers, creating monumental real estate development, replacing traditional "bazaars" by swanky malls and so on. The chief requirement to carry out such projects is that of land. The core city being bereft of land, the attention simply falls upon the fringes where land has different primary extractive uses. Gurgaon, which was earlier a part of peri-urban Delhi, has been witness to 600 acres out of 700 acres of net cultivated land being acquired for the development of real estate.

Peri urban areas are identified by their transitional character. It is here that the transition sets forth in the form of transition in the usage of land as a resource. "Geophagy" is the term coined by Morello (2000) to identify the consumption of agricultural land for urban activities. The major urban land uses which find their way into this zone are roads, industries, power stations, urban recreational amenities like golf course and amusement parks, residential complexes and even dumping grounds and treatment plants for urban wastes. The rich agricultural land as such loses its basic character and is added to the urban areas. This gradual encroachment of land not only includes the cultivated tracts but also the other natural landcover, like forests, water bodies and wetlands

which may be present at the fringes. As such the ecological hinterland slowly gets transformed to the landscape hinterland (Morrello et al, 2000).

The following table gives a reference to the actual Fig.s of land conversion in eight peri urban villages around Kumasi.

	Responses	
Agricultural land converted to:	Number	%
Residential	144	62
Commercial/ Industrial	17	7
Education/Civic/ Infrastructure	15	6
Combination of above	48	21
Others	8	3
Total	232	100

(Source: Brook and Davila. 2000)

This land issue, of course, is not the sole factor. In an agriculture dominated country like India, land is intimately related to the economic, cultural as well as social life. Besides, its deepest link with the ecosystem must not be forgotten. With the change in the land use, the life style of the dependents undergoes change. Often these dependents are the initial residents of the same region. These people suddenly find themselves amidst a phase of transition to which they must adhere. This change gets more pronounced with the introduction of new residents in the same region. The setting up of big housing estates and residential complex along the city fringes has become a common affair of the present times and these mainly attract the higher and middle income groups of residents. They can afford to stay away from the main congested city yet manage to carry out their daily commutation to the city as most of them have their own personalized vehicles. Also, mass transit system is developed in most metropolitan cities. People of the lower income groups are either displaced to new sites or they remain and get adjusted to the changing neighborhood structures.

The entire economic structure of the region is often challenged. Land use change invites new occupational options. Occupational diversification sets in as the city offers highly paid jobs. On the other hand sometimes the traditional occupation structure of the villages gets destroyed. In Karena village of Faridabad, village ponds have been auctioned to contractors for fishing for 2-3 years and as such the village pottery industry is suffering due to the lack of clay supply. This has implied a change in occupation of the village potters to agricultural labourers (Narain, 2009). However, often the jobs offered to the unskilled population get restricted to daily labour, mainly at the new construction sites and the informal sector of the economy. As such, poverty prevails among them. When this issue of poverty is linked with the newly introduced urban consumerist culture, the lower income groups find themselves in extreme deprivation, economically, socially and psychologically.

A critical associated issue of land use change is that of compensation to the farmers. The problem is that often, the farmers or the actual owners of the rural land do not get compensated for their loss. This adds to peri urban poverty and loss of economic support of the family. The Kumasi study shows that most of the farmers did not receive any compensation, and for those who received, it was usually offered as a building plot (41%) or cash (31%), although

it was never sufficient (Gregory, 2005). An interesting feature of land acquisition in Basai village, Gurgaon is that farmers with scattered lands were affected less than those with concentrated lands. Regarding compensation it is evident that only the actual land owners have been compensated but those landless labourers who worked there had been neglected and were deprived of the livelihood opportunities (Narain, 2009). Therefore, this whole matter of compensation not only includes the actual owners of the land but must also take into serious consideration the future of the dependents of that land.

Land Use Change and the Environment

A crucial issue of land use change along the peri urban fringes is its impact upon the environment and the ecosystem of the region. The sacrifice of the natural greens at the altar of urban development leads to serious disruptions in the ecological balance. Often, the region loses its entire natural characteristic. Due to increased deforestation at the fringes, most of the forest lands in Kumasi have been converted to grasslands (Gregory, 2005). This change in the natural flora may have affected the fauna of the region also. Soils pits are dug in these regions to cater the needs of landfills, brick kilns and a variety of urban projects, very few of which are ever redeemed. These add to the visual disamenity of the region (Simon, 2008).

The peri urban interface is often selected for locating landfills and dumping sites for urban wastes. The wastes collected from the city are piled up for processing. The waste treatment plants are also located in these areas. The foul odor from these junkyards pollutes the air and these location also become host to a number of disease vectors like mosquitoes, flies, rodents and more, thus raising the chances of disease outbreak and endangering the livelihood of the local residents and also the people who work at these sites, like the rag pickers and the urban farmers. The leachates from these wastes contaminate the soil as well as the water resources.

A common practice of the peri urban interface is that of the use of the treated waste, both solid and liquid, for cultivation. In Sri Lanka, the term "kera kotu" refers to the use of urban waste to grow vegetables (Dayaratne and Samarawickrama, 2003). In Bamako and Ouagadougou, about 600-700 tonnes of waste are generated each day, 1/3rd of which is organic waste and this organic waste is used by the farmers as fertilizers and a source of nutrient for the crops, 0.29% N and .16% Ph (Eaton and Hilhorst, 2003). In Hubli Dharwad, urban sewage waste consists of 35% compostable waste; 35-40% plastics, glass and rubber; 15-20% building debris; 5% metal; and 5 to 10 % woody biomass (Brook and Davila, 2000). The farmers find it economically viable to use the composted solid waste as fertilizers than buying the expensive substitutes from the markets. The pumping of waste water for irrigation is considered cheaper than borehole irrigation. However, the increased use of urban waste in urban agriculture generates threat to human health, for both the producers and the consumers. As the waste generated is partially decomposed the risks of pathogenic contamination are greater. Composting organic waste can be successful only if it is done at high temperatures or that the waste is left to decompose for more than one year. The risks of entrance of high concentrations of heavy metals in the food chain also exist (Birley and Lock, 1998).

Conclusion

Significant conceptual clarity emerges from an extensive review of existing literature. The approaches to conceptual aspects reflect the multi dimensional facets of the region. Different techniques have also been framed to analyze the various aspects of the fringe. The application of modern techniques have made the study of this region more scientific and it evidently incorporates clarity in assessing the nature of problems and its management perspectives. The unique nature of being neither purely urban nor completely rural deserves a different approach for planning. It is necessary to go beyond the conventional ideas of urban or rural planning to bring about proper development of the peri urban interface.

It is primarily the lack of basic information about the complexities of the peri urban interface that the region has long remained beyond the purview of planners. The dynamic nature of the fringe is a challenge for planners. The ideal meeting of the rural and the urban shall mean the preservation of the natural rural serenity with that of the extension of all basic urban amenities. There shall be enough residential space but not at the cost of the rich fertile agricultural lands of the villages. The fringes must not be treated as dumping grounds of all urban wastes to make the lives of the residents miserable. The rural greens shall not be sacrificed for creating space for any displaced industry considered harmful for the city life. The residents of the peri urban interface shall be provided with all the necessary urban amenities and may well be treated as an inseparable part of the urban system.

References

Adell. G., 1998,"Theories and Models of Peri urban Interface: A Changing Conceptual Landscape", Strategic Environmental Planning and Management for the peri urban interface research Project, London, University College London.

Allen, A., 2003," Environmental Planning and Management of Peri-urban Interface: Perspectives on an Emerging Field", Environment and Urbanization; Vol15; No 1

Allen A., da Silva N.L.A. and Corubolo, 1999, Environmental Problems and opportunities of the peri-urban interface and their impact upon the poor", Draft for discussion, Strategic Environmental Planning and Management for the Peri-urban Interface Research Project, DPU

Andrews B. Richards, 1942, "Elements in the Urban Fringe Pattern", Journal of the Land and Public Utility Economics, XVIII

Bandhyopadhyay. S. 2010, "Urban Expansion and Its Impacts Upon Land: Emerging Issues and Methods of Analysis", DRS Monograph [In Press]

Banzhaf, E. et. al. 2009, "Monitoring urban to peri urban development with integrated remote sensing and GIS information: a Liepzig, Germany case study", International Journal of Remote Sensing, Vol 30, No.7

Birley M. H. and Lock K., 1998, "Health and peri-urban natural resource production", Environment and Urbanization, Vol.10 No. 1

Blizzard W.S., 1954, "Research on Rural Urban Fringe", Sociology and Social Research XXXVIII No. 3

Brook R. M. and Davila J.(ed.), 2000, "The Peri- Urban Interface: a Tale of Two Cities", School of Agricultural and Forest Sciences,

University of Wales and Developmental Planning Unit, University College of London

Cadane, P., 2005. "Dynamics of Peri-Urban Areas: from the French case to the developing countries", Peri-Urban Dynamics: Population, Habitat and Environment on Peripheries of Large Indian Metropolises, CHS Occasional Paper N 14

Dayaratne R. and Samarawickrama R., 2003, "Empowering communities in the peri urban areas of Colombo", Environment and Urbanization, Vol. 15 No. 1

Dupont, V., 2005," Peri-Urban Dynamics: Population, Habitat and Environment on Peripheries of Large Indian Metropolises: An Introduction", CHS Occasional Paper N 14/

Eaton D. and Hilhorst T., 2003, "Opportunities for managing solid waste flows in the periurban interface of Bamako and Ouagadougou", Environment and Urbanization, Vol. 15 No. 1

Ganguli M., 1967," The Nature of Fringe Areas of Calcutta", Geographical Review of India, Vol.29

Gregory, P., 2005, "A Synthesis of Peri-urban Research of Kumasi, Hubli-Dharwad and Kolkata Peri-urban Interfaces", Final Report of Project R8491, Natural Resource System Programme.

Ichikawa, K. et. al, 2006, "Transition of satoyama landscape in the urban fringe of Tokyo Metropolitan area from 1880 to 2001", Landscape and Urban Planning, 78,

Jargowsky, P. A., 2005, "Comparative Metropolitan Development", Peri-Urban Dynamics: Population, Habitat and Environment on Peripheries of Large Indian Metropolises, CHS Occasional Paper N 14

Kurtz R. A. and Eicher J. B., (1958), "Fringe and Suburb: A Confusion of Concepts", Social Forces, Vol 37 No. 1

Liu. Y., et. al., 2007," An integrated GIS-based analysis system for landuse management of lake areas in the urban fringe", Landscape and Urban Planning, 82

Lopez. E., et. al., 2001, "Predicting land-cover and land-use change in the urban fringe: A case in Morelia city, Mexico", Landscape and Urban Planning, 55

Martin T. W, 1953, "The Rural Urban Fringe: A Study of Adjustment to Residence Location (Eugene, Oregon: University of Oregon, 1953)

Mookherjee D. 1963," The concept of Urban Fringe and Its Delineation", Geographical Review of India, Vol.25

Morello J. et. al., (2000), "Urbanization and the consumption of fertile land and other ecological changes: the case of Buenos Aires", Environment and Urbanisation, Vol 12 No 2

Narain V. and Nischal S. (2007), "The peri urban interface in Shahpur Khurd and Karnera, India", Environment and Urbanization, Vol 19 (1)

Narain V. (2009), "Growing city, shrinking hinterland: land acquisition, transition and conflict in peri urban Gurgaon, India" , Environment and Urbanization, Vol 21 (2)

Pryor R.J, 1968,"Defining the Rural Urban Fringe", Social Forces 47

Ramachandran R., 1989," Urbanization and Urban Systems in India", Delhi, Oxford University Press (Reprint 2001).

Rodehaver, op. cit., 1947, "Fringe Settlement as a Two Directional Movement", Rural Sociology, XII

Rohilla. S. 2005,"Defining Peri Urban A Review", Peri-Urban Dynamics: Population, Habitat and Environment on Peripheries of Large Indian Metropolises, CHS Occasional Paper N 14

Simon. D., 2008,"Urban Environments: Issues on the Peri Urban Fringe, Annual Review of Environment and Resources

Shu Li Huang et al, 2009, "Sprawl in Taipei's peri-urban zone: Responses to spatial planning and implications for adapting global environmental change", Landscape and Urban Planning

Sutton, P. C., et. al. 2010, "Darkness on the Edge of Town: Mapping Urban and Peri-Urban Australia Using Nighttime Satellite Imagery", The Professional Geographer, 62, 1

Tacoli C. 1998a,"Rural Urban Interaction: a Guide to the Literature", Environment and Urbanization, Vol. 10

Wehrwein, E. G. 1942," The Rural-Urban Fringe", Economic Geography, Vol. 18

Syantani Sarkar
Senior Research Scholar,

Sumana Bandyopadhyay
Associate Profesor
Department of Geography,
University of Calcutta
Kolkata W.B.