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Shahab Fazal

Land Use Dynamics
in a Developing
Economy
Regional Perspectives
from India



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Land Use Dynamics in a Developing Economy

Regional Perspectives from India

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Chapter 1

Introduction

Land represents an important resource for the economic life of a majority of people in the world. The way people handle and use land resource is decisive for their social and economic well-being as well as for the sustained quality of land resources. Land use however is not only a realm of those directly using it; it is exposed to a part of the wider reality of social and economic development and change. Land resources are used for a variety of purposes which interact and may compete with one another. Land use and its transformation is therefore a highly dynamic process. Land transformation accelerated and diversified with the onset of the Industrial Revolution, the globalization of the world economy, and the expansion of population and technological capacity.

As land cover, settlement represents the most profound alteration of the natural environment by people, through the imposition of structures, buildings, paved surfaces, and compacted bare soils on the ground surface (Richards 1990). Settlements also create demands that lead to other land-cover changes, such as the removal of vegetation and soil to extract sand, gravel, brick clays, and rock; the replacement of vegetation by planted cover in gardens, parks, sports grounds; the alienation of ground for landfill and waste treatment; wetlands and open space conversion for settlements; and the use of land for transportation routes.

Urban expansion and quick transformation of land is a worldwide phenomena in relation to urban growth, not only in North America (Squires 2002), Western Europe (Couch et al. 2008), and Japan (Sorensen 1999), but also in cities of developing countries (Keiner et al. 2005). But the urbanization process among developing countries greatly varies from that of developed countries. The urban growth in recent times is not only more pronounced but also abrupt and volatile in developing world where as this process was relatively smooth and gradual among developed countries (Fazal 2006).

Today, India remains by and large a rural agricultural country as the share of agricultural workers in the workforce is still 59 % and above 70 % people living in rural areas in 2011. Meanwhile, the share of population living in urban areas has also increased and is about 27.8 % in 2011. But these figures do not tell the whole story.

There are evidences that urban growth is increasingly dispersed and urban sprawl promotes the spread of urban land use into the rural–urban fringe and draws a larger number of people into the rural–urban interface (Fazal 2008). Although, the growth rate is not increasing sharply, the absolute increase in urban population is very large, having increased up to 286 million in 2011. In the course of development, it is likely that out of the enormous number of rural people lacking opportunity in the economically lesser developed places where they usually come from, many will continue to migrate to the cities.

Box 1: What does ‘Cities’, ‘Urban’, and ‘Rural’ mean?

‘Rural’ and ‘urban’ areas are often conceptualized in opposing terms to each other. Population density and economic activity are the predominant criteria that have been used to define ‘urban’ versus ‘rural’ areas. However, related criteria such as administrative functions and infrastructure development are also used. Rural areas are generally regarded as places of low population densities with predominantly agricultural economies whereas “urban” areas are regarded as places with high population densities distinguished by a service economy. Hence small towns with even a minimum of ‘urban’ characteristics are regarded as urban.

The term urban is typically used as a synonym for city, however the two are not the same, all cities are urban areas but not all urban areas are cities. “Urban” is a statistically variable concept. It is defined differently by different governments and there is significant variability between countries in the official classification of urban areas.

Source World Resources Institute 1996–1997 and Cecilia Tacoli 1998

1.1 What is ‘Urban’ and What is ‘Rural’?

The difference between urban centers and rural areas may seem so obvious that definitions are not an issue; however, there are major variations in the ways in which different nations classify an urban center or a rural settlement. The criteria used include population size and density, and availability of services such as schools, hospitals, and banks, etc. Mostly, combinations of criteria are used to classify them, which vary greatly in different parts of the world. In India, the Census of India uses the unit of classification in this regard as ‘town’ for urban areas and ‘village’ for rural areas. In the Census of India 2001, the definition of urban area adopted is as follows:

- (a) All statutory places with a municipality, corporation, cantonment board or notified town area committee, etc.
- (b) A place satisfying the following three criteria simultaneously:
 - (i) a minimum population of 5,000;
 - (ii) at least 75 % of male working population engaged in non-agricultural pursuits;
 - (iii) a density of population of at least 400 per km² (1,000 per sq. mile)

For identification of places which would qualify to be classified as 'urban' all villages, which, as per the 1991 Census had a population of 4,000 and above, a population density of 400 persons/km², and having at least 75 % of male working population engaged in non-agricultural activity were considered.

Towns with population of 100,000 and above are called cities.

Box 2: Rural and Urban Living

People inhabit different parts of the world and lead different types of lives. Their lifestyles change across the various regions on Earth and so do their mentalities. The resources available in their regions have a direct impact on their way of living. People all over the world have been divided into two distinct groups by this marked line of difference between an urban and a rural life. Those inhabiting urban areas lead an urban life while inhabitants of rural parts of the world experience a rural living.

Urban Living

Urban areas are equipped with all the modern amenities. The modern-day facilities are widely available in the urban areas. A majority of the households of the urban areas are blessed with this technological advancement.

Due to a greater availability of all the modern facilities along with an increase in career opportunities, people of the urban areas lead an economically more stable and a luxurious life.

The increasing attraction of the people towards the urban parts of the world has resulted in crowding of urban areas. The increasing population, majority of which prefers settling in urban cities, has led to an imbalance in the density of human population. Excessive industrialization has invited environmental problems like pollution.

However, the rise in economic growth that has resulted in self-sufficiency in the common masses has resulted in a self-centered nature of society. While technological advancement has brought the world closer, human beings have gone far apart from each other.

Rural Living

Rural areas are not crowded with concrete constructions all over. Houses are rather widely spaced with ample room for farms and open spaces. Rural areas are some of the only areas fortunate enough to house the greens. People in rural areas live in close proximity of nature. Apart from people, there is room for pets and grazing animals that help maintain equilibrium in nature.

The rural parts are not overcrowded by people. These areas are blessed to have least amounts of pollution.

The life may not be as lavishly led as that in the urban areas, but the people there are generous and their hearts have room for emotions. Rural are the ones where humanity is still alive.

Every coin has two sides to it. While the rural living is deprived of luxury and technology, it is rich in terms of its relationship with 'nature'. The urban life is update in terms of technology and career prospects. However, the falling humane qualities and a disrupted environmental balance shadow the bright future of urban living.

1.2 Outside the City Boundaries: The Areas Surrounding Urban Centers

The areas surrounding urban centers have many different manifestations in the literature in terms of the way it is conceptualized and delimited. Wehrwein (1942), in his work on cities in the United States used the term rural–urban fringe. His example was followed by many others, including Ramachandran (1989), Thakur (1991), Lin (1994), Nangia (1976), Yadav (1987), Fazal (2000) and Lucas and Van Oort (1993). Many other terms are also found in the literature for the areas surrounding urban centers, implying different delimitations and levels of analysis. There has been great diversity in the terminology used: *rurban fringe* (Schenk 1997), *urban fringe* (Kumar 1998; Kabra 1980; Hill 1986), *rural hinterland of the city* (Kundu 1989), *the city’s countryside* (Bryant et al. 1982), *peri-urban fringe* (Swindell 1988), *rural fringe of the city* (Leeming and Soussan 1979), *peri-urban areas* (Dupont 1997; McGee 1991), *desakota regions* (McGee 1991), *metropolitan fringe* (Browder et al. 1995; Rao 1991; Saini 1989), and *edgelands* (Gant et al. 2011). Research in languages other than English includes descriptions such as the Dutch *ruraal-urbane overgangszone tussen stad en platteland* (Drujven 1996) and the French *Périurbanization* (Dupont 1997), *le périurbain* (Banzo 1998), *espace péri-urbains* (Vennetier 1989). *This research uses to the term peri-urban interface, which is defined as an area of mixed rural and urban populations and land uses, which begins at the point where agricultural land uses appear near the city and extends up to the point where villages have distinct urban land uses or where some persons, at least, from the village community commute to the city daily for work or other purposes.*

Importantly, the areas surrounding urban centers (PUI) in general is frequently ignored as a specific area within the study of urbanization. “It is symptomatic that ‘urban studies’ and ‘rural and regional studies’ prevail over ‘fringe studies’ (Ansari and von Einsiedel 1998). Moreover, in India most of the studies are for metropolitan or large urban centers and smaller cities lying in the shadows of these large cities are mostly untouched. The *peri-urban interface* of Aligarh city, therefore, promises to be an interesting area to explore important aspects of the development in modern India.

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Chapter 2

Peri-Urban Interactions

The peri-urban interface (PUI) is a social, economic, and environmental space where three systems (agricultural, urban, and the natural) are in constant interaction. The peripheral areas of the urban settlement have been defined, conceptualized, and delimited in various ways. It began in 1940s, when changes in the surrounding areas of the city came under increasing attention from spatial disciplines, (urban geography) in western world. The urban geographers focussed on investigating the processes which were shaping the urban peripheries, the place where urban and rural activities met. The term urban fringe was first used by American geographers and by 1940s and 1950s, it was widely adopted in the academic literature for the transition zone between city and countryside (Johnson 1984). Soon the complex functional relations and heterogeneity of dynamic social structure of the urban fringe set to originate debate on its physical and conceptual boundaries.

A morphological and functional approach of the urban fringe was used for analysis of morphology, land use change in an irradiating pattern from the urban side. This was argued by human and rural geographers as the transitional landscapes between urban and rural were not necessarily the result of urban driven processes and they coined the term rural–urban or urban fringe. Thereafter, some terminological and conceptual work initiated by Kurtz and Richer (1958), tried to differentiate the urban fringe from suburbs; Wissink (1962) identified pseudo suburbs, satellites, pseudo-satellite towns, and inner and outer urban fringe. Andrews distinguished between urban fringe and rural–urban fringe. Some other terms were also used like Duncan and Reiss (1958) such as rural nonfarm areas and rural farm areas. Pryor (1968) in his study, define the changes in the peri-urban interface with a new categorization based on the analysis of different phases according to land use to differentiate peri-urban areas from rural periphery. Pahl (1965) moving away from physical definition of the fringe, defined it as being the result of particular social processes. Carter (1981) proposed a definition of rural–urban fringe as the space on which the town extends as the process of dispersion operates, an area with distinctive characteristics which is only partly assimilated

into the growing urban complex, that is partly rural and where many of the residents live in the country, but are not socially and economically of it.

The city in western world since 1960s become less and less a discrete local place as the urban experience becomes more 'universal'. The basic urban expansions from central city, first to suburbs and then to the larger decentralized 'urban field'. Thus, urban-rural dichotomy vanished against the emergence of the rural-urban continuum, where pattern of activities developing not on a place but on a region. In this context, Melvin Webber (1964) introduced the concept of 'non place urban realm'.

More recently, with in the frame work of current discussions, new terminologies were used, either making reference to a new kind of urban development (a new landscape of employment and other activity concentrations away and independent from older urban centers), or stressing the processes underpinning the new developments (in particular the impact of flexibility in production systems and technology) (Oatley 1997).

Thereafter, the discussion was around the argument that the central transition in urban form, involves a shift from the compact/suburban dualistic pattern to the spread metropolitan and from monocentric cities to multi-centred urban areas (Garreau 1991; Harvey 1995; Hall 1996; Dick and Rimmel 1998 etc.).

During 1990s, a new lexicon has emerged that attempts to capture contemporary forms of urbanization like edge city, technourbs, technopolis, flex space, super urbia, outer cities, perimeter cities, or even perimetropolitan bow waves, and so on (Oatley 1997). The transition to the conceptualization of these new landscapes is challenging perceptions and knowledge raising questions about the necessary adaptations of the urban and regional planning set of conceptual and practical tools to cope with the new territorial reality across the continents (Adell 1999).

Thus, the term PUI is used in many ways for different circumstances (Mycoo 2006; Simon et al. 2006). The notion of PUI is used in three main different ways, namely, as a place, a process, or a concept (Narain and Nischal 2007). Shindhe (2010) also notes that spatially, PUI is a transitional zone around a city, secondly as a zone of intense interactions, and thirdly as a zone which acts as a link between urban and rural areas. Simon and McGregor et al. (2006) note that rapid urban population growth and expansion of the built-up area and the impact of externally driven macroeconomic adjustment policies have combined to alter the interface between 'urban' and 'rural' quite profoundly in many places. This view is echoed by Bower and Tanya (2006), who note that PUI is where rural and urban land uses coexist, which may be in continuous or fragmented units in any one area has greater validity as a basis for peri-urban studies. Thus, 'peri-urban' refers to rural fringe areas surrounding the cities that bear the spillover effect of urban expansion. Moreover, their residents are portrayed as losers in the urbanization process (Narain 2009). Often, they come into conflict with residents of the core city over the use and allocation of land and other resources (Janakarajan 2009).

Studies for developing countries have also highlighted the acquisition of agricultural lands in the PUI, which has brought in widespread transformation in the peripheral villages (Fazal 2000). This process has also been associated with

widespread dissent for policies of land acquisition (Narain 2009). It has affected in many ways the access of peri-urban residents to resources, especially the land (Narain 2009). Schenk (2004) and Rohilla (2004) also emphasized that development and changes in PUI, both planned and unplanned, are extremely heterogeneous creating tension and conflicts.

The city's fringe has been placed under pressure increasingly with increased demand due to rapidly changing social, cultural, and economic values associated with land and its resources. The rapid sprawl of cities, outside its political boundaries and beyond its real physical-cultural domain possesses several attendant conflicts and stresses, and has also stimulated various adaptations of human activities. These are reflected through diverse facets, such as changing suburban, peri-urban, and adjacent or interstitial rural land uses. India is passing through a transitional phase, where the urban centers are the focal points of change (Fazal 2001). Urban areas have become centers of all the activities, they are exploding in size, land use is changing quickly and constantly intensifying urban lands, and large scale land transformation is taking place due to substantial increases in urban land value. The real expansion, growing size of cities, and the resulting invasion of the rural land by urban forces have caused a succession of land uses in a discordant and disassociated way (Fazal 2004).

Several studies have highlighted the fact that the character of urban land-use patterns in Indian cities is very different from those in western cities, but have also observed a degree of homogeneity within the Indian cities (e.g. Yadav 1987). Breese (1974) stated that the characteristic feature of Indian urban land use is its high degree of mixing, often to the extent that it is difficult to discern any pattern. Even in large cities, this sort of indiscriminate land use persists. In Kanpur, for example, Chandrasekhar observes that most of the markets have double use (i.e., both residential and commercial), and that density is particularly high in the central part of the city (Chandrasekhar 1998). Similar features have been noticed near the Victoria Terminus Railway Station in the metropolitan city of Bombay (Arunachalam 1998). Similarly, in Madras, where the industrial areas are closely intermixed with residential developments (Dattatari 1998). In smaller cities and towns, the intermixing of land use is even more pronounced (Alam and Pokshishvsky 1976). Fazal (2000, 2001) in his studies found that small Indian cities tend toward linear development; he further stated that these urban areas are exploding in size, land use is changing quickly, constantly intensifying urban lands, and large-scale transformation is taking place due to substantial increase in land value. This is resulting in deterioration of the natural eco system. He stated that urbanization process is haphazard and unplanned; there were little provision of open spaces, adequate infrastructure and services in urban expansions. While western cities have different land-use zones characterized by dominant uses, Indian cities tend to have different areal blocks with several activities in each (Surekha 1988). These results in a division of a large city into smaller entities, which are mostly self contained and loosely coordinated with each other. It is the Indian way to compromise with space by saving long distances. This is because of the general tendency of the people to live near their workplace to save on travel.

Even wealthier and higher strata people try to settle in the city center (Mishra 1998). Thus, land uses of various sorts are so mixed that people find everything ordinarily necessary within walking distance. That is why Indian cities are rightly termed pedestrian cities (Surekha 1988).

The problem of rapid and uncontrolled urban growth and its inevitable consequences on the city and regional landscape, especially in the developing countries has been a serious concern for scholars in urban and regional affairs as well as city managers. Perhaps, more worrisome are the surreptitious city encroachment on fertile agricultural land and other socioeconomic implications on the peri-urban areas of most cities. The scope and magnitude of problem of urbanization transcend the city limit to include the peri-urban areas. In most cities of developing countries, the problems are compounded by phenomenal population explosion and sporadic physical development in the context of unwillingness and inability of urban governance to minimize negativities associated with rapid growth, while maximizing urban benefits. One of the most dramatic illustrations of consequences of urbanization is the surreptitious city encroachment on rural hinterland. The quantum of rural hinterland engulfed by a given city over time would thus provide insight into the processes and implications of urbanization, and the opportunity to evaluate the impact of city growth beyond urban limit.

Although Aligarh is a relatively small city, compared to other cities for which the literature is available, (most of them are for metropolitan cities) it is also a fast growing city in India. The issues examined here are certainly not limited to Aligarh city and many of the features can be traced with other cities as well. Like many other cities in north India, Aligarh is expanding fast, moreover, it too is surrounded by a populous rural area with productive and rich agricultural hinterland. Such conditions give rise to many conflicts between rural and urban economies, values, and people. However, they can also generate mutually beneficial complementarities in the rural and urban spheres. The net outcome is highly selective for different groups and different locations.

The expansion of the city strongly influences the villages in terms of land use and population, both physically and in a socioeconomic sense. Its influence stretches far beyond the immediately adjacent area. This study concentrates on the land-use dynamics and its characteristics in the PUI.

A period of about 30 years, approximately one generation, was chosen as the time frame for two reasons.

- First, there are some relevant secondary sources that provide insight into local history and the situation in the 1980s.
- Second, this time span corresponds with the period of reliable 'recall' by most respondents and is manageable for the researcher.

In the present study, the basic issues which have been investigated are, first to examine the concepts relating to peri-urban interface, second, the study investigates land-use issues and the pressing problem of how land degradation should be interpreted in a rural–urban fringe. Third, the study explores how different 'actors' interact to influence land transformation (Fig. 2.1).

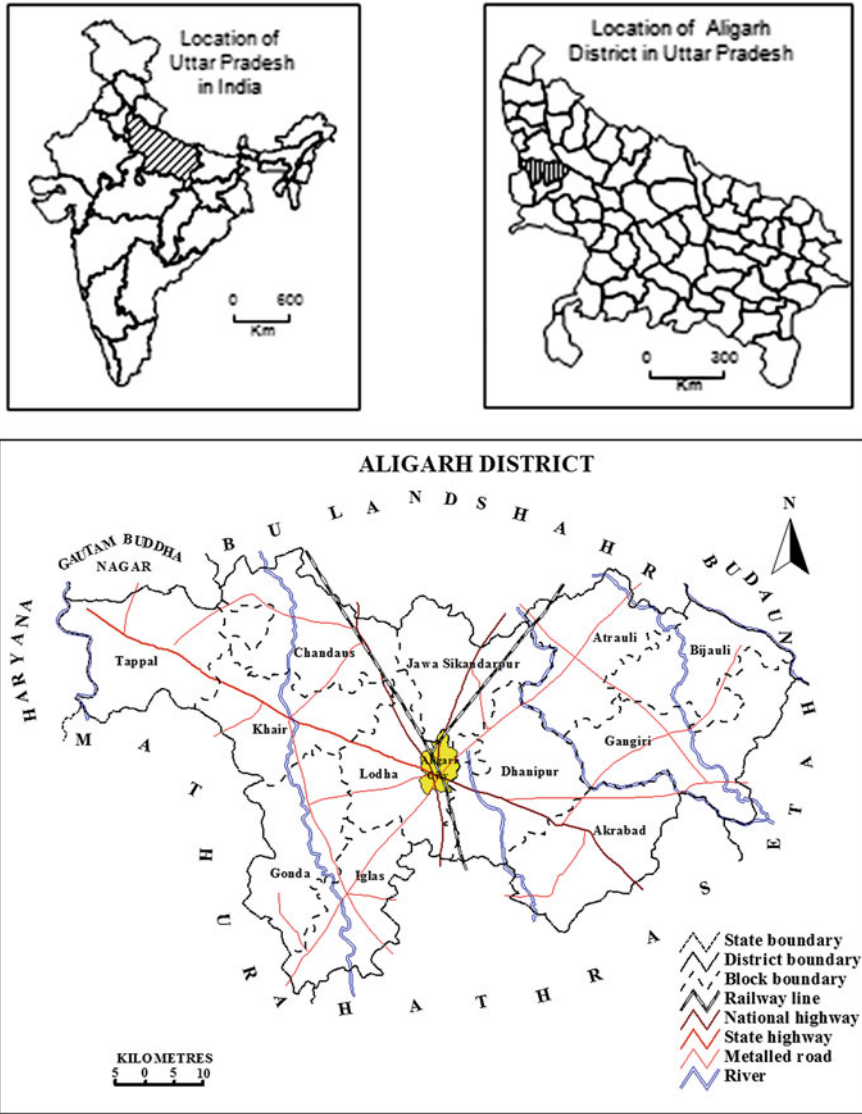


Fig. 2.1 Location of Aligarh city

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Chapter 3

Conceptualizing Peri-Urban Interface

Cities are dynamic human artifacts; they constantly undergo structural change, redevelopment, and growth. Such processes also involve changes in urban relationships with the surrounding territory, most conspicuously on their outskirts. The spatial and environment-development issues in the transitional zones between distinctly urban and clearly rural areas, which have historically been labeled, studied, and understood in different ways. Nevertheless, their importance everywhere lies in their dynamic mix of functions and land uses; increasing population densities; growing significance as sources of urban food, construction materials, and other resources; as urban waste disposal or treatment sites; and as recreational zones.

Traditionally, social scientists concerned with urbanization, the relationships between urban areas and their hinterlands, or human activities and behavior within such areas have relied on a simple urban–rural dichotomy. Implicit in this construct was the idea that urban and rural areas were characterized by very different land-use patterns and human behaviors, and that the boundaries between these spaces and places were easily discernible and clear cut. The widespread perception that the urban fringe represented a short-term transitional area that had little enduring interest or importance. Rural and urban areas, and the differences between them, therefore dominated research agendas until quite recently.

On account of these characteristics, and the interactions between such areas and the cities, they came to be known as peri-urban zones or interfaces (PUIs) and have become major research foci in their own right. In other European or Europeanized languages, the PUI concept is expressed somewhat differently, e.g., *halfstedig* (half or semiurban) in Dutch; *urban-landlichen Zonen* (urban–rural zones) in German; and *buitestedelik* (outer city or beyond the city) in Afrikaans (12, 13, p. 5). There is a tendency, not least in Germany and the United States, to equate the rural–urban fringe or PUI with suburbanization, but these are not identical or equivalent processes. Although there is clearly an overlap in both concepts and actual usage of the terms, suburbs would more helpfully be distinguished as principally residential areas already forming part of the built-up urban area, the outermost edge of which constitutes the start of the urban fringe. PUIs would then comprise distinctive zones of mixed character beyond the suburbs.

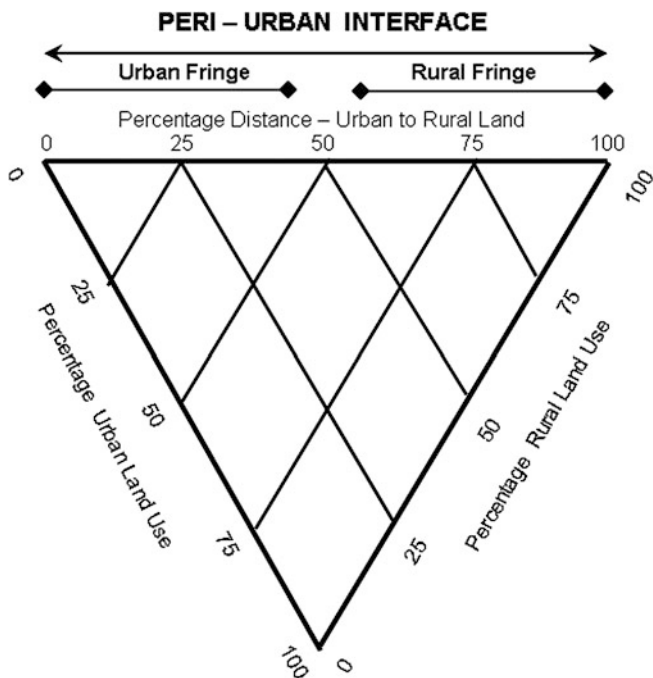


Fig. 3.1 Schematic diagram showing broad land use in peri-urban interface

3.1 Traditional Conceptions of the Peri-Urban Interface

The literature on the *peri-urban interface* is included in different groups of works dealing with topics such as urban and rural relationships and their links, the extension of metropolitan growth on its surroundings, or changes, and transformations in the economic, social, cultural, and environmental realms etc. The PUI is conceptualized as transitory zone between rural and urban settlements (Fig. 3.1).

One of the literature reviews on the PUI, Nottingham and Liverpool Universities (1998) recognize “the complexities of building a spatial framework around what is essentially an amorphous and mobile site for the interaction of various social, economic, and cultural processes and interlinkages between the rural and the urban”. Rakodi stressed the relationship between urban and the immediate rural areas being the result of a process over time; the PUI is a dynamic zone both spatially and structurally (Rakodi 1998). Here the idea of “shifts” or evolution of the edge of the cities moving “outwards” is clear. The PUI seems, thus, to be considered as the result of urban driven processes more than of territorial processes, where rural and urban forces interact. Browder et al. (1995), has underlined it by stating “traditional conceptions of the metropolitan fringe”, the term that are preferred to *peri-urban areas*, considering it as somewhat specific to the French research literature.

The French literature on African cities is seen as constituting “the most robust and thematically unified conception of fringe development” (Browder et al. 1995). This trend of research saw the poor or “informal” fringes of the city as spaces that are the product of the interaction of state intervention and policies, and the action and practices of the inhabitants seen as everyday use and appropriation of spaces, land, and housing strategies and self-building practices (Schteingart 1989; Haumont and Marie 1987).

Similarly, both Latin American and Asian research have also contributed significantly to the development of the conceptual framework for understanding the expansion of the city into the peripheral rural surroundings and the key themes are:

- (i) the importance of the informal economy in the peri-urban areas, reflected in the proliferation of petty commodity production, multiple job holding, self help housing, informal lending, unlicensed activities, and so on.
- (ii) the importance of peri-urban agriculture and rural linkages, such as food brought from the home village of a peri-urban resident, cash income remittance to rural villages, consumer goods, and information, all these mainly in African context, while in Latin America, rural–urban linkages on the metropolitan fringe are not typically strong, and in Asia the increased mobility between sectors is blurring the economic distinctions.
- (iii) conflictive land property ownership issues are typical on the fringe, because of pressures from squatters, private developers or speculators, large tenants, and so on. Different land market conditions feature dual systems (informal and formal) and various property and tenancy arrangements such as rental or customary right systems.
- (iv) the demographic processes that underpin fringe development, where they can range from organized land invasion to planned expansion of the fringe subsuming existing rural villages, including the speculative subdivision of farmland near the city, the re-settlement of eradicated down-town slum inhabitants into public housing projects, or even temporary (daily, seasonal or circular) migration “especially in the Asian metro-fringe sites” (Browder et al. 1995).

3.2 Peri-Urban Interface: Review of Selected Case Studies

Leeming and Soussan (1979) described the fringe area as the zone of land on the periphery of city which is experiencing a process of transformation from rural modes of production, social interaction and land use to characteristically urban ones, or which has experienced this process in the recent past. At one time this fringe acts as the interface between the city and the surrounding rural areas. Thus the fringe is a transitional zone into which the city is expanding. This is a different

phenomena from the zone of urban influence, which is much more extensive, usually called its hinterland.

Ramachandran (1989), while reviewing urbanization and urban systems in India has attempted to trace the origins and definition of the phenomenon of the rural–urban fringe in India. Since post independence in India when the urban scene has changed, the rapid growth of cities could not be accommodated within the limits of the existing cities and the character of the peripheral villages underwent significant change. He sticks to the term rural–urban fringe and also stated ‘the rural–urban fringe is an area of mixed rural and urban populations and land uses, which begins at the point where agricultural land uses appear near the city and extends up to the point where villages have distinct urban land uses or where some persons, at least, from the village community commute to the city daily for work or other purposes’ (Ramachandran 1989).

According to Ramachandran (based on the above definition) the fringe in Delhi extends well beyond the city limits. It is an area outside the municipal limits and is an important area of new residential, industrial and commercial development, representing the outward expansion of the city. Urban corridors and suburbs fall within the rural–urban fringe zone, while satellites, green belts, new towns and counter magnets lie outside the zone of rural–urban fringe. This area lacks civic services such as water supply, sewage, drainage, and garbage disposal.

McGee (1991) in his book *The Extended Metropolis-Settlement Transition in Asia* reviews the conventional definition i.e. the concept of ‘urban transition’ positioned within a broader paradigm of transition in the space economy of countries, which is quite significant in the Asian context. McGee in his model of spatial configuration for Asian country, identifies five main regions of the spatial economy as follows:

- major cities of the urban hierarchy and in case of Asia dominated by one or two extremely big cities.
- peri-urban regions are those areas surrounding the cities within a daily commuting reach of the city core.
- *desakotasi* (derived from Bahasa Indonesia—*desa* for village and *kota* for town or city, *si* for process)—are regions of an intense mixture of agriculture and non agricultural activities that often stretch along corridors between large city cores, characterized by dense populations engaged in agriculture.
- densely populated rural regions.
- the sparsely populated frontier.

McGee defines Peri-urban as “those areas surrounding the cities within a daily commuting reach of the city core. In some parts of Asia, these regions can stretch for up to 30 km away from city core” (1991, pp. 6–7). According to McGee there are at least three types of spatial economy transition occurring in Asia with the historical evolution of high density and mostly rice growing areas:

- *Desakota* Type 1: These are regions that have seen a decline in rural settlement, land use and where agricultural population has moved to urban centres.

For example, a country like South Korea and Japan with rural landscapes in which most of the economically active work is based on non-agricultural activities.

- *Desakota* Type 2: These are regions where over a varying period of time with productivity gains in agriculture and industry and shifts from agricultural to nonagricultural population concentrated on core city and adjacent regions. These are also areas of rapid economic growth compared to other regions of the country.
- *Desakota* Type 3: These are regions with high density but slow economic growth and marked with involuntary economic activities. Such regions are generally located along secondary urban centres.

Later Robinson (1995) described the growth of mega cities and emerging spatial patterns as, i.e., decentralization and dispersal in ASEAN mega urban regions. Decentralization and dispersal is seen as one of the effective ways of relieving or reducing the extreme negative effects of these rapidly growing metropolises. *Decentralization* happens where people and/or economic activities are moved from the urban cores into the peripheral areas and along major transportation corridors radiating from urban cores with metropolitan region. *Dispersal* happens when people and activities are located outside secondary or provincial cities or other growth centres. It is observed that most of the decentralization has occurred mainly as a result of natural market forces rather than government policy. Though in recognition of the advantages of poly centricity, most Asian mega cities have adopted spatial planning strategies aimed at developing a decentralized form in their metropolitan regions. These are usually incorporated in their master plans. Robinson (1995) reviewed his experiences of a number of Asian mega-cities Calcutta, Delhi, Bombay, Dhaka, Seoul, Manila, Jakarta and Bangkok. According to significant decentralization has been achieved in Asian mega cities. The urban area/built-up expanded manifold and also the bulk of decentralization have been occurring in the form of “ribbon development” along major transport corridors leading out of the core city.

Overseas Development Agency’s Renewable Natural Resources Research Strategy, defined the peri-urban and stated that “the peri-urban interface is characterized by strong urban influences, easy access to markets, services and other inputs, ready supplies of labour, but relative shortages of land and risks from pollution and urban growth” (ODA 1999) and deliberately defined the PUI into two broad zones:

- the zone of direct impact,
- a wider, market-related zone of influence.

Simon (2008) addresses the complexities of changing peri-urban production and livelihood systems in the context of rapid urbanization in poorer countries, distinctive peri-urban challenges of appropriate and flexible planning and development, and the future prospects for enhanced sustainability in the most challenging category of development-environment interfaces.

Bentnick (2000) focussed on the rural–urban fringe and referred to it as the ultimate “battlefield” of the environmental and socioeconomic change brought about by urbanization. He finds that “urban studies” and “rural/regional studies” prevail over ‘fringe’ studies and rural–urban fringe is ignored as a specific area within the study of urbanization. In his research work on urban land-use in fringe of Delhi, he stated his area of focus based on ‘The same criteria-urban land-use on the urban side of the fringe and occupation on the rural side of the fringe are used here to formulate a working definition of rural fringe:

The rural–urban fringe extends from the contiguous built up area of the city (no rural landuse) to the area where most villages show a majority of workers engaged in non-agricultural occupations (many of whom commute)’. Bentnick’s work focuses on urbanization at the micro level and within a 25-year time period. The researched area is the Alipur Development Block (administrative division), comprising 59 villages and situated on the north of the National Capital Territory (NCT) of Delhi. Using the land-use pattern and the transformation in occupational structure of six villages were selected to study the “stages of metropolitanization” were studied. The study described three selected villages that are subject to the strong impact of urbanization. In addition, the study evaluates a completely urbanized village that shows the ultimate impact urbanization is having on the living conditions of villagers as well as migrants.

Similarly, Lintelo et al. (2001) examined the nature and significance of urban and peri-urban agriculture in general and with particular reference to Delhi. They observed that demographic and economic extension of cities, through processes such as migration and industrialization tend to be accompanied by spatial expansion, resulting in encroachments by cities upon adjacent urban areas. In a detailed study of “urban” as well as ‘rural’ Delhi using satellite images for 1998 Lintelo observed that the actual conurbation is noted to have stretched beyond the administrative boundaries in southern (Gurgaon), south eastern (Faridabad) and eastern (NOIDA and Ghaziabad) directions.

The area beyond these above-mentioned towns is predominantly agricultural and within the NCT Delhi referred to as wider Delhi in north, north-west and west between the urban city center and the towns situated on the peripheries lie important but diminishing agricultural areas. Around the city in NCT Delhi, large areas still follow crop production, fallow land cycle and plantation or grassland. In fact, 17 % consist of built up areas clearly indicating that agriculture was still a major land use in and around Delhi.

The research study focuses on 30 select revenue villages concentrated in three clusters in south western, north western and north directions in the fringe areas of Delhi. The authors have taken six villages for detailed case study of occupational pattern. It has been observed that urban and peri-urban agriculture is a dominant and dynamic land use in Delhi although geographic locations of the fringe may shift over time with waves of urbanization. According to their need the study on peri-urban agriculture concentrates on area/villages between Delhi and the towns situated on its peripheries ‘areas distant from city and rural in character will subsequently start falling within the cities reach or ‘band of influence’.

Dupont (2004) has analyzed the developments in urban forms and population redistribution in the Delhi Metropolitan Area as part of the development of the mega-city of Delhi in terms of:

- focusing on the processes of peri-urbanization and rurbanization,
- population redistribution within the metropolitan area.

The emphasis is on the major role migration has played in the demographic evolution of the capital city. The urban development of Delhi has been seen to be shaped by planned as well as informal urbanization in the periphery thereby resulting in the interweaving of urbanized zones, as well as to a blurring of the distinction between rural and urban population categories.

Dupont stated in the conclusion that “the urban development in the metropolitan area of Delhi results from the combined effects of spontaneous dynamics of new migrants and city dwellers, market forces, and attempts of town planning at the level of National Capital Region, the distinction made between three planning zones (the territory of Delhi, the first urban ring, i.e., the peripheral towns of the Metropolitan Area, and the zone beyond the Metropolitan), runs the risk of becoming an obsolete theoretical distinction, overtaken by the rate at which the actual dynamics at work is evolving. The ring towns have, thus, become an integral part of gigantic conurbation extending from the capital outwards. In the framework of growing globalization of economies and the growing influence of the liberalization and disengagement policies of the states, the control of the development of megalopolis appears more and more problematic in the face of contradictory interests and forces” (Dupont 2004).

Laquinta and Drescher (2001) attempted to introduce new typologies of peri-urban and applied the typology to issues of natural resources planning and management. Their work is based on seven premises and different from others:

- Rural, Peri-urban and Urban form a linked system (R/PU/U)—an uneven or lumpy multidimensional continuum.
- In terms of migration and urbanization peri-urban environments play a mediating role between rural and urban.
- Peri-urban environments are places of social compression and dynamic social change.
- Understanding the nature and operation of the system requires a focus on the underlying dynamic processes rather than the ‘fixed states’.
- The potential for food production and its relationship to food security must be evaluated across the entire R/PU/U system.
- Effective policy intervention rests on interdisciplinary understanding, which incorporates physical, biological and socio cultural paradigms.
- The ‘social footprints’ of urbanization manifest differently in the urban, peri-urban and rural context but is understandable when addressed in view of a linked system (R/PU/U).

They argued that it is not an essential element of the definition that peri-urban has to have “proximity to the city”. It is just incidental to an elemental

understanding of peri-urban. Concentration on simple geographic location as the basis for defining peri-urban misses the point of a clear understanding of rural–urban spectrum as dynamic, interactive, and transformative. Thus, peri-urban is clearly more than just an urban fringe. According to Iaquina and Drescher (2001), *urbanisation* is a process of concentration and intensification of human life and activity. It is an uneven process as a result of three fundamental population processes—fertility, mortality, and migration that takes place in a physical environment. Such processes occur due to individual and household decisions undertaken in a socio cultural, economic, political, and environmental context.

The typology of peri-urban by Iaquina and Drescher is composed of five ideal types: Village Peri-urban, Diffuse Peri-urban, Chain Peri-urban, In-place Peri-urban, Absorbed Peri-urban and the five elements embedded within the broader rural–urban dynamic. The typology derives from underlying socio-demographic processes, especially migration in which the transformative linkages are organized along the dimensions of migration and time. The typology remains connected in the form of organic two way exchange networks, which can be summarized as follows:

- Village Peri-urban: Rural villages with an urban consciousness, these areas are geographically nonproximate to an urban area. Its designation as peri-urban rests on its social psychological transformation rather than geography and size.
- Diffuse Peri-urban: A separate category of peri-urban comprising areas proximate to the city and which are settled depending on migration. The immigrants come from a variety of geographic source points.
- Chain Peri-urban: Geographically close to the city; this is an urban fringe that undergoes settlement vis-à-vis a process of chain migration. Areas identified as “squatter settlements” around the cities of developing countries mostly relate to this type.
- In-Place Peri-urban: Geographically close to the city and result from in-place (in situ) urbanization, natural increase and some migration. These are areas in the process of being wholly absorbed by actual expansion of the urban fringe or simple reclassification.
- Absorbed Peri-urban: These are areas proximate to or within the city that have been absorbed for a considerable period of time. These areas derive from either in-place peri-urban areas or from chain peri-urban areas.

Based on the above typology, Iaquina and Drescher have argued that rural migrants move first to villages or small towns then successively to more urban environments. There are two kinds of links that persist across *space* in face of geographic displacement and links that persist across *time*. Together, Diffuse Peri-urban and Chain Peri-urban most closely approximate the “urban fringe” definition used by geographers. In-place Peri-urban has some similarities of the fringe but would more closely fit into *Desakota* type. Village Peri-urban on the other hand is completely unrelated to the urban fringe concept.

Stephenson (2001) examines various problems of the developing countries with reference to urban water management and peri-urban structure. He observed

“peri-urban areas” to be different from both the high income suburban sprawl which is distinct from the rapidly growing unstructured settlements springing up around developing areas such as Rio de Janeiro/Sao Palo, Buenos Aires (villa’s miseries) Kampung in Jakarta, squatter settlements around Johannesburg, the urban sprawl in India among other such settlements across the South.

Kumar (1998) looks at the process of metropolitanization in urban agglomeration across India and defines peri-urban in regional context as outgrowths. He observed that the question of peri-urban development cannot be addressed outside the framework of balanced development of both rural and urban areas. He stated “urban is not a homogenous category and bias in the differential scale needs to be acknowledged” (2002, p. 13).

Brook et al. (2003) working under a DFID sponsored project working in the Hubli–Dharwad region (India) have emphasized that the PUI is not primarily a location, although it has a place where it exists and it has a process. This includes people, flows and interactions—flows of people, goods, finance, and pollution, among other similar issues that are part of the process. According to them “there is no single satisfactory definition of the peri-urban interface, and moreover, different definitions will probably apply in different circumstances, and may even change in the same location over time; for example, as a medium-size city becomes large one” (2003, p. 2). Thus, the *definition will differ* for different situations.

Rohilla (2004) observes urban growth as an evolutionary process. His research focus is on groundwater and urban development in the process of metropolitanization of Delhi over a period of time. He defines the “peri-urban” areas of Delhi in his case as “an area/villages in the evolutionary process of urban development, including villages engulfed in the process of urbanization (referred as ‘urban villages’) already part of the city and the suburban areas/villages including outgrowths on the fringe of an existing city, which are in the transitional phase of urban development (planned/unplanned) which in a period of one or two decades will become part of the city limits”.

The DFID 1999 Report outlined peri-urban area as an interface, a transitory zone of mixed rural and urban economic, social, cultural and natural resource uses at the periphery of cities in developing nations. The principle findings of the report are as follows:

- the peri-urban may be best examined in terms of the development processes.
- no single theory or model adequately explains activities in the rural urban fringes.
- the peri-urban areas locate new populations, which in turn is the cause of natural resource depletion as well as pollution.
- most peri-urban developments have biophysical impacts extending beyond their immediate boundaries.

According to the DFID report, peri-urban development can be considered as part of this wider urbanization process. With the growth of cities in developing countries, the peri-urban area moves in waves. The report concludes that “definitions of what constitutes ‘peri-urban’ are thin and inconsistent and literature

directly relating to peri-urban areas is not substantial". Further, it stated that statistics related to urbanization are varied and definition of "urban" settlement and quality of data differs country to country which makes international comparisons difficult and local factors more important than generalized assumptions characterizing the nature of peri-urban.

To conclude, it can be said that the literature on PUI is in large volume but because of its dynamic nature the definition and delimitation are rather inconsistent. This is largely due to differences in site and situation which results in different kind of urbanization process and the resultant impacts on PUI. There is general acceptance for PUI as transitory zone, where combination of rural and urban activities meet. PUI is dynamic and generalization and comparisons are difficult as local factors act differently at different locations. The PUI is to be considered as a region of change and not a distinct boundary, where the process of change is crucial.

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Chapter 4

The Study Area

4.1 Aligarh City: Geographic Location

Aligarh is a class 1 city of the state of Uttar Pradesh, situated in its western part between Ganga and Yamuna rivers at 27° 53' north latitude and 78° 35' east longitudes. It is the head quarter of Aligarh district, spread over an area of about 44.82 km².

The district of Aligarh extends from 27° 29' to 28° 11' north latitude and 77° 29' to 78° 38' east longitude. River Ganga and Yamuna make its east and west boundaries, respectively, while in north Bulandshahar district and in south Hatharas district are situated. Aligarh district has been divided into six tehsils, namely Koil, Autrauli, Sikandrarao, Iglas, and Khair. Aligarh city is located in koil tehsil of lodha block and the city lies almost in the center of Aligarh district. Presently, Aligarh city has been divided into 70 wards. This city has gained importance because of its proximity to the national capital (New Delhi) and also known for the Aligarh Muslim University.

4.2 Aligarh City: Historical Evolution

In early history, the settlement was associated with the kingdom of *Surasena*. The settlement in this region begun around 1500 BC. An ancient town existed here which was known as *Koil* or *Kol*, named after an *Asura* king. Atkinson regards origin of Aligarh as a Buddhist settlement following 400 BC Around second century AD the area came under the possessions of *Mauryas*, *Sakas*, *Kushans*, and *Naga* rulers. Archeological remains of 5th to 9th century AD belonging to *Gupta* period and *Harsha* empire have also recorded from Aligarh. In 10th century AD one of the old settlement identified in Aligarh city as *Achal Tal* (tank) area located in south-east. Twelfth century AD marks the arrival of Muslims in this region. In 1194, *Qutubuddin Aibek* took the fortress of *Kol* and *Balbon* and constructed *minar* tower in 1253 just close to present *Jama Masjid* on the great mound. Four dynasties, namely, the *Slave's* from 1194 to 1240, *Khilji's* from 1290 to 1320, *Tughlaq's* from 1320 to 1414, and *Lodha's* from 1451 to 1526 contributed to the

control and construction of Aligarh. During the reign of *Ibrahim Lodhi* (1526 AD), a permanent fortress known as *Ramgarh* was constructed, which is still existing. *Umar Khan* built the fort of *Mohammadgarh* in 1526, which was later known as Aligarh. During the medieval period *Balai Qila* area acted as the socio economic and political hub. Throughout this period, there were walls and gates around the city, i.e., *Madar, Delhi, Turkman, Sasni, and Aligarh Darwaza*. In eighteenth century, *Sabit Khan* was appointed as governor of *Kol* and he constructed the *Jama Masjid*. Marathas took over the Aligarh fort in 1785. Thereafter the Britishers rule the city, during their rule the city spread northwards and economically progressed. After the British occupation in 1804, the present district of Aligarh was formed and the term *Kol* ruined. With the increase of population industries were developed. Initially cotton industry (1802) was established, beside this, other industries like crude glass, glass bangles, and later lock industry were established and flourished.

The most remarkable during the evolution and development of the city was the establishment of *Mohammedan Anglo Oriental (MAO) College* in 1875 which is now known as Aligarh Muslim University. This was founded by *Sir Sayed Ahmed Khan* to educate Muslim people. Now, it is one of the central university of India and is situated in civil line area.

Aligarh city, because of its historical background and evolution, consists of three different socio-cultural areas.

- The ancient area, dominated by Hindu Population
- The medieval area, dominated by Muslim Population
- The modern area, dominated by mixed Population of both Hindus and Muslims

These areas, instead of losing their identity with time, have retained it. Incidences of communal riots have strengthened the segregation on communal lines.

4.3 Aligarh City: Physical Setting

Physiographically, the study region contains vast alluvial plains, having a gentle slope from north to south and south east. Topographically, this district represents a shallow trough (sauce-pan shape) and it can be divided into

- The khaddar plain found mainly along the river Ganga in the east and along the Yamuna river in the west
- Eastern and western uplands
- The central low-lying tract.

Aligarh city is located almost in the center of this central low-lying tract. The average elevation of the city from the mean sea level is 178 m. The flat monotonous plain of the city is dotted by several water bodies like *Gursikharan, Sheka*, and so on. The Ganga and Yamuna flowing along the boundary of Aligarh district are the source of bringing alluvial soil, which is spread over the whole of the

district. The major types of soil found in the district are *domat* (clay), *baloi-domat* (sandy clay), *bhur* (sandy), *reh* (alkaline), and loam soil. Large part of Aligarh city and its environs falls under saline and alkaline type of soil (*reh*). This is mainly due to bad drainage resulting in high concentration of salts and pH value.

Aligarh city is drained by river *kali*. It is a seasonal river and becomes very significant during rainy season. The upper *Ganga* canal and the *Hathras* branch canal and other distributaries like the *Machua* distributary, *Harduagunj* distributary, *Kohiri* distributary, *Maheshpur* minor etc., also flow in this area. The small seasonal streams and *nalas* (drains), which have no permanent source of water like *Aligarh* drain, *Somna* drain, *Chandhana* drain, and *Ahraula* drain, also flow in this area.

4.4 Aligarh City: Climate

The climate of Aligarh city falls under the subtropical climate zone and is characterized by hot summer and chilly winter. Extreme climatic conditions can be found here, because in summer the temperature reaches up to 47 and in winter it may fall to 2 °C. The summer season confined to the months of April to June, records an average temperature between 30 and 37 °C, which occasionally rises up to 47 °C. Most of the rainfall occurs under the influence of South-West monsoon, in the months of July, August, and September. During this period, temperature is much lower but humidity accentuates the heat. The rainfall is scanty in this area and ranges from 60 to 75° cm/annum. In winter heavy fog in the morning, lasting till afternoon and frost during nights are hall marks of the severe winter spells, especially in the month of January which is the coldest month (Fig. 4.1).

4.5 Aligarh City: Flora and Fauna

Aligarh city lies in the subtropical division of deciduous type of vegetation. Aligarh district was largely covered with heavy *dhak* jungles once which gradually are turned into agricultural lands. In the khadar of Ganga river, there is a considerable extent of *jhau* or tamarisk. Aligarh city cannot be described as wooded. The most common trees found around the city are mango, *babul*, *neem*, *pipal*, *ber*, *sheesham*, *gular*, and *jamun*, and so on.

4.6 Aligarh City: Administrative Set Up

Aligarh city is the main urban and administrative center of Aligarh district. Aligarh came into existence as a district in 1804. The district is further divided into six subdistricts (tehsils), each with its own divisional head quarters. These six tehsils



Fig. 4.1 The study area

have been further subdivided into 17 blocks. These blocks again subdivided into total 1,210 villages.

Aligarh city is located at the Lodha block of Koil tehsil. Municipal Corporation was formed for Aligarh city in 1975, while the formation of Aligarh Development Authority was taken place in 1981. The First Master Plan and Second Master Plan were drafted in 1981 and 2001, respectively for the city. This city which initially had 19 wards (1971), but now it is divided into 70 wards (2008) and a mayor is elected to administer the city.

4.7 Aligarh City: Marketing Centres

Aligarh city has a good number of markets to meet the requirements of the people. The CBD of Aligarh encompasses Railway road, *Phaphala*, *Barahdwari*, and *Chauraha Abdul Karim*. There is an agglomeration of both wholesale and retail trade in this area. Certain areas of the city are famous for wholesale and retail goods. The important ones are *Mamu-bhanja* area for hardware items and electronics goods, *Phaphala* for pharmaceuticals items, *Dhanipur* for vegetables and cereals, and *Bans ki Mandi* for timber and house building materials. There are about 90 marketing centers in Aligarh city. Every locality in the city has a market

center and some of them have grown up in recent years to become new commercial hubs such as *Jamalpur*, *Dodhpur*, *Amir Nishan*, *Kelanagar*, *Kuwarasi*, *Soot mill*, *Sasni gate*, and so on.

4.8 Aligarh City: Transport and Communication

There are 10 major roads which all converge at Gandhi park, almost at the center of the city. These roads include national highway (N.H.-91) or G.T. Road which connects the city with *Delhi and Kanpur*, N.H.-93, which connects with *Anupshahar*. Apart from these roads, there are several state highways which radiate out of the city to connect other important towns of the state. Among them important are *Ramghat road*, *Khair road*, *Gonda road*, *Agra road*, *Mathura road*, and so on. These roads have acted as the important agent helping in the development of the city. Recently, big factories and other industrial establishment have sprung up along these roads providing the city a radial dimension. Besides these roads, there is well developed internal road network connecting important locations within the city. However, the roads of older city are narrow and congested while the newer part has wider roads.

There are two main bus terminals—*Masoodabad* bus terminal along G.T. Road and *Gandhi park* bus Terminal from where U.P. State Road Transport Corporation buses serve cities all over the state of Uttar Pradesh and many other cities in Uttarakhand, Rajasthan, Madhya Pradesh, Delhi, Punjab, and Haryana. There are five other private bus terminals in Aligarh city, which connects the city with nearby rural settlements.

Aligarh is also connected with rail network, the Aligarh railway station is a railway Junction. It is on the main railway route connecting national capital Delhi with states of West Bengal, Orissa, Bihar, Jharkhand, North-Eastern states of Assam, and most of the parts of U.P. (Table 4.1).

4.9 Aligarh City: Employment Opportunities

The city offers different type of occupational opportunities, which fit to different sectors and draw different incomes. The city has well-developed secondary activities where a large number of skilled and semi-skilled workers (37 % of total workers) are engaged. The most famous is lock industry beside it other industries like engineering industries, building fitting, electrical goods industries, and chemical industries have also helped the city for its development. A good number of small-scale units of brass work, edible oil, sugar, cotton textile, cotton ginning, dairy, glassware, readymade garments, handloom, and weaving provide jobs to the city population. This city also has a large number of people engaged in tertiary sector (61 % of total workers), associated with Aligarh Muslim University, other

Table 4.1 Aligarh city: passengers movements by bus from different terminals 2010

Serial no.	Name of the bus terminals	No of buses	Average no of passengers	Name of the route
1	Gandhi park terminal	176	8,800	Lucknow, Agra, Moradabad, Mathura
2	Masoodabad bus terminal	75	3,375	Delhi
3	Khair	40	1,600	Zebar, Tappal, Khair
4	Gonda	24	760	Gonda
5	Chharra	25	1,025	Chharra, Sankar
6	Gangiri	20	800	Gangiri
7	Jalai	35	1,400	Jalali
8	Autaruli	33	1,485	Atrauli, Ramghat, Bijauli
9	Qasimpur Ramghat	20	800	Sadhuasram
10	Anupshahar	90	3,150	Aniupshahar, Nonora
11	Sambhal	22	550	Sambhal
12	Pahasu	12	370	Pahasu
13	Barauli	12	510	Barauli
14	Amrauli, Barauli, Pahasu	24	960	Amrauli, Barauli, Pahasu
15	Qasimpur	20	600	Qasimpur

Source ADA 2010

educational institutions, banks, post offices, health, communication, trade and commerce, and so on.

4.10 Aligarh City: The Population

The total population of Aligarh city is 669,087 according to 2001 census. With the increase of population, the city requires developments in housing, amenities and facilities, and employment opportunities etc., which as in other cities of India do not match with the city population. This leads to stress on existing facilities creating problems such as mushrooming of slums, environmental pollution, unemployment, congestion, water and electricity crisis, and so on (Tables 4.2 and 4.3).

4.11 Aligarh City: Transformations in Agriculture Based Activities

The study area receives scanty and erratic rainfall, where 80 % of total rainfall happens in the month of south west monsoon from mid-June to September. Rest of the year it is mostly dry. On the other hand, soil is generally sandy loam having

Table 4.2 Aligarh city: decadal growth of population

Census year	Population	Difference of population between two decade	Difference in percent
1901	72,084		
1911	66,344	-5740	-8
1921	66,963	619	0.93
1931	83,878	16,915	25.26
1941	112,655	2,877	34.31
1951	141,618	28,963	25.71
1961	185,020	43,402	30.65
1971	252,314	67,294	36.36
1981	320,861	68,547	27.17
1991	480,520	159,659	49.76
2001	669,087	188,567	39.24
2011	872,575	203,488	30.41

Source Census of India

Table 4.3 Aligarh city: working population engaged in different economic activities

Economic activities	1981		1991		2011	
	No. of workers	%	No. of workers	%	No. of workers	%
Primary workers and agricultural laborers	3,320	5.21	4,234	3.40	5,648	2.43
Households workers	4,253	6.68	6,883	5.51	12,416	5.34
Other than households industries	17,615	27.65	40,449	32.38	78,976	33.98
Construction	1,790	2.81	4,206	3.37	7,919	3.41
Trade and commerce	1,3200	20.72	29,304	23.46	55,412	23.85
Transportation and communication	7,270	11.41	7,400	5.92	11,510	4.95
Other activities	16,250	25.52	32,432	25.96	60,496	26.03
Total	257,065	100	490,202	100	232,377	100

Source Census of India

high rate of permeability. Thus, the agriculture is heavily depended on the irrigation, especially through tube well and canal irrigation which are expensive. The urban shadow effect is greatly affecting the agriculture activity in the surrounding rural areas of Aligarh city. The land value is increasing and the high cost of farming inputs have made small and marginal farmers vulnerable in modern monetized urban economy. This has seen as one of the reason for the trend of transformation from farming activities to nonfarming activities in the study area. Another cause of livelihood transformation is high growth of population which is resulting fragmented and smaller land holdings. All this is making agriculture, which was preferred livelihood option as lesser favored occupation.

4.12 Aligarh City: Evolvement of Peri-Urban Interface

Rural areas surrounding the Aligarh city lack the amenities and facilities like employment in secondary and tertiary sectors, education, transportation-communication system, water supply etc., which are available in the city. These availabilities are the pull factor to attract migrants from the surrounding villages. The influx of migration into the city caused the residential population to grow and the city expanded physically to accommodate it, first through the development of vacant land within the city itself, and later by the slow encroachment on land in areas lying outside the city limits. The net result has been the intrusion of urban land uses within the rural areas surrounding the rapidly growing Aligarh city.

There is a particular pattern of stages through which village community (surrounding Aligarh city) passes as the villages get transformed from a rural entity into an urban one. The increase in population by natural growth and migration in Aligarh city, it expanded from city center toward surrounding villages to accommodate these people. The village economy gets tied up with the growing city. There is phenomenal increase in linkages with daily movement from the village to the city in order to supply the different commodities such as perishables, like vegetables, milk, and flowers or low valued natural resources such as bricks, earth, fuel wood etc., to the city. There are metalled roads connecting the peripheral rural settlements with Aligarh city and even the city transport system also extends its services to these settlements. Daily visits to the city job, domestic requirements, recreation, and medical facilities have become increasingly important. With time and improvements in the communication and transport facilities, the linkage with the city has improved significantly. The village in the fringe area is no longer inhabited by traditional village population only. It also becomes a living place for industrial workers etc., who like to take advantage of comparatively low rents. Thus, the rural settlements around the Aligarh city have evolved into rural-urban fringe. The city spreads in Lodha, Akrabad, Sasni, Dhanipur, Jawan, Atrauli, Iglas, Gonda, and Khair block. Many of these areas, till recent past, were predominantly rural settlements but now absorbed the urban character also. Many villages have come into the direct influence of urban expansion and now lie in the urban limit. Kishanpur, Dodhpur, Begpur, Jamalpur, Bhamola, and Nagla Baraula are all examples of urban absorption as these settlement witnessed in mute silence their transformation from rural into urban.

Chapter 5

Methodology and Data Sources

In order to draw upon a comprehensive range of information, the study makes use of a variety of resources and methods. The study is based on both primary and secondary source of data.

5.1 Primary Data

Primary information was collected through field survey with sampled farmers and other local actors in the study area. The quantitative data regarding social, economic, and livelihood structure were collected from primary sources using a well-structured questionnaire. This household-based purposive sample survey was conducted in the Aligarh city's PUI.

The sample survey provides grounds for answering most of the research questions; specifically, it allows us to generalize its effects on—and the response by—the village population. The sample survey not only collected quantifiable variables, but also acquired longitudinal elements of the respondents. The questions elicit information on circumstances that influence reactions, choices, and strategies.

The researcher also took help of local informants which included village headmen, property dealers, elderly people who know the village history, local teachers, and other well-informed local people. Persons in relevant positions at government departments, planning agencies, academic institutions, and in the local administration have also been consulted. They were particularly helpful when starting the research. Later, they provided a means to double-check informations, and they gave feedback on research results. Various people in such positions were interviewed to find out about policy and practice, and to appreciate the discrepancy between the two.

5.2 Secondary Data

These include statistical information on the city and the various settlement forms, and their expansion in the regions and field areas concerned. The proposed study of secondary data, which aims to set the overall context of land use change as well as to measure it, will cover a 30-year time span (1980–2010).

Census data provided useful information at the village level and more generally, about the land and population in the area. The village level secondary data were collected through the village revenue officer (*Patwari*) who keeps records on village land, including its use and ownership. Disaggregated data at the household level were used to analyze land ownership and transactions. Some additional background information on the villages was derived from various statistical bulletins and governmental publications, as they provided a historical perspective.

Satellite images were crucial to this study, because they represented the physical aspects of the urbanizing environment of the PUI villages. IRS-1D pan images of Aligarh city and its environs for 2000 and 2010 were used. The base map was prepared taking help from the topo sheet maps and Aligarh city guide map prepared by survey of India (1978) at the scales 1:50,000 and 1:20,000. Cadastral maps were also obtained from the local land administrator providing details about the ownership of individual plots.

5.3 Data Analysis

The study basically integrated the primary and secondary data to assess the primary influences of urbanization processes on land use. The spatial analysis was done mainly using GIS techniques (simple overlaying, cross operations, buffer operations etc.), and basic statistical techniques (simple percentage distribution and cross tabulation) was also used for the analysis of data.

5.4 Methodology

The present study is based on the secondary sources of data and supplemented by primary sources of data. The secondary data included the census data for demographic informations, published data, and reports from City Development Authority (ADA), municipal board, and satellite imageries for land use, land cover mapping, and land transformation analysis. The primary data were collected through structured questionnaires from the sample survey conducted on 52 households (Annexure 1).

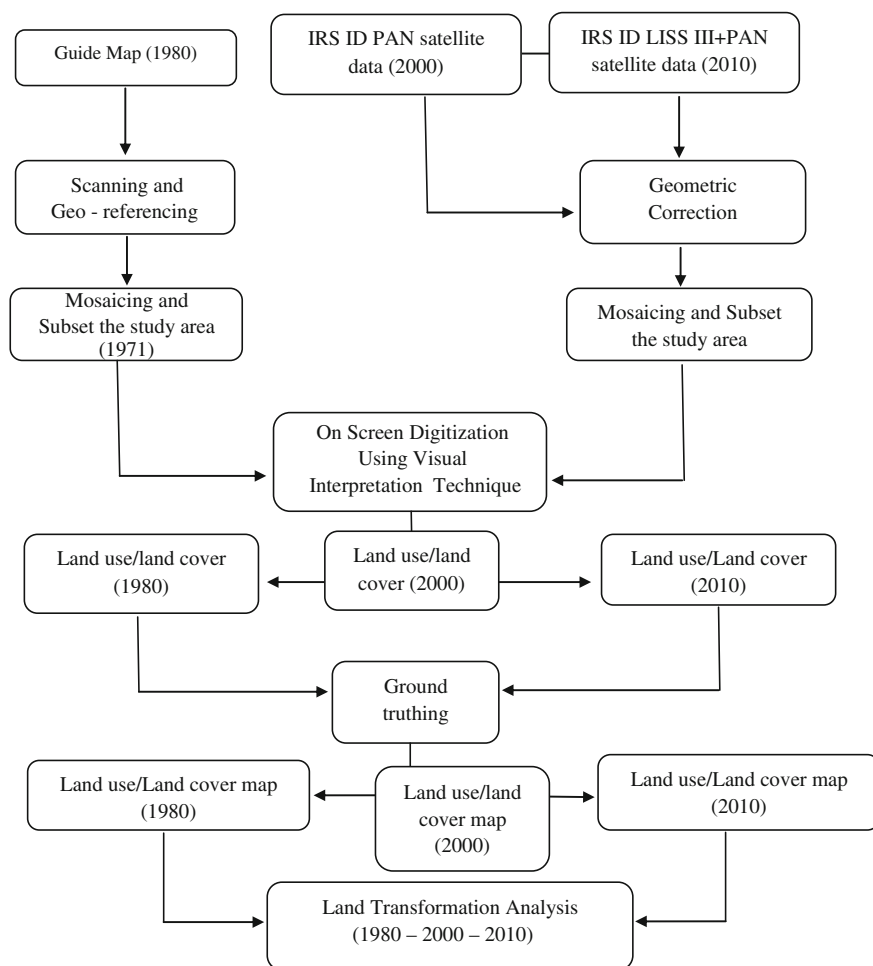


Fig. 5.1 Flow chart of methodology

Details of data sets used

Source	Data type	Years	Resolution /scale	No bands
IRS-1D	LISS-III	2010	23.5 m	3
IRS-1D	PAN	2010	5.8 m	1
IRS-1D	PAN	2000	5.8 m	1
Topo sheet	54 I/1	1978	1:50,000	–
Guide map	Aligarh City	1980	1:20,000	–

The satellite data were enhanced before classification using histogram equalization for the better interpretation and to achieve better classification accuracy (Rahman et al. 2011). Furthermore, the images including topographical sheet were rectified to a common Universal Traverse Mercator (UTM) projection/coordinate system. The data sets (LISS-III data and guide map) were resampled to 5.8 m spatial resolution using nearest neighborhood resampling technique in Erdas Imagine software to make it comparable to IRS PAN data 5.8 m cell size. Then, 'on screen' digitization was performed on these data sets. To prepare land use/land cover (LU/LC) maps for the years 1980, 2000, and 2010 of the study area, Level-II LU/LC classification scheme has been used. To validate results of classified land use/land cover map, 25 sample points were verified, which represented all major land use/land cover classes. This process considerably improved the accuracy of LU/LC classification. Further, the land use/land cover map between 1980, 2000, and 2010 was prepared using ILWIS software. Further, land transformation map and its matrix were generated using GIS techniques. This methodology is also shown in the flow diagram (Fig. 5.1).

Reference

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Chapter 6

Land in Aligarh's PUI

Human activities have been recognized as a major force shaping the biosphere. Understanding these actions and the social forces that drive them is crucial to understanding for managing and responding to such change. Changes in the land have often been seen as improvements by some or all land users. Alteration is nearly inseparable from human occupation and use, and the goal is to encourage improvement and to counter forces that encourage degradation. To assess what effect a particular land transformation and its consequences will have involves difficult issues of forecasting (future resource demands and opportunities as affected by technical and socio-economic change) and evaluation (distribution and the rights of future generations). However, we now possess a better scientific knowledge of the physical extent, character, and consequences of land transformation which serves as the foundation for any such assessment.

Box 3: Land Resource, Land Use/Cover

Land and Land Resources refer to a delineable area of the earth's terrestrial surface, encompassing all attributes of the biosphere immediately above or below this surface, including those of the near-surface climate, the soil and terrain forms, the surface hydrology (including shallow lakes, rivers, marshes, and swamps), the near-surface sedimentary layers and associated groundwater and geohydrological reserve, the plant and animal populations, the human settlement pattern, and physical results of past and present human activity (terracing, water storage or drainage structures, roads, buildings, etc.) (FAO/UNEP 1997).

Land Use is characterized by the arrangements, activities, and inputs by people to produce, change, or maintain a certain land cover type (Di Gregorio and Jansen 1998). Land use defined in this way establishes a direct link between land cover and the actions of people in their environment.

Land Cover is the observed (bio)physical cover on the earth's surface (Di Gregorio and Jansen 1998).

Land is not regarded simply in terms of soils and surface topography, but encompasses such features as underlying superficial deposits, climate and water resources, and also the plant and animal communities, which have developed as a result of the interaction of these physical conditions. The results of human activities, reflected by changes in vegetative cover or by structures, are also regarded as features of the land. Changing one of the factors, such as land use, has potential impacts on other factors, such as flora and fauna, soils, surface water distribution, and climate. Changes in these factors can be readily explained by ecosystem dynamics and the importance of their relationships in planning and management of land resources has become increasingly evident.

Box 4: Functions of Land

The basic functions of land in supporting human and other terrestrial ecosystems can be summarized as follows:

- a store of wealth for individuals, groups, or a community
- production of food, fiber, fuel, or other biotic materials for human use
- provision of biological habitats for plants, animals, and microorganisms
- co-determinant in the global energy balance and the global hydrological cycle, which provides both a source and a sink for greenhouse gases
- regulation of the storage and flow of surface water and groundwater
- storehouse of minerals and raw materials for human use
- a buffer, filter, or modifier for chemical pollutants
- provision of physical space for settlements, industry, and recreation
- storage and protection of evidence from the historical or pre-historical record (fossils, evidence of past climates, archeological remains, etc.)
- enabling or hampering movement of animals, plants, and people between one area and another

A large number of different land uses are found in the PUI than any where else. The city spreads out into its rural fringe like an advancing wave. But, there is more than just the advance of the built up edge. There are irregular patches of urban and urban associated land uses. Aligarh city's PUI is characterized by ribbon like development, where city expansion is advancing along the highways and roads leading out from the city (Fazal 2001). This wave like spread of irregular, scattered patches, ribbon like development, and continuous subdivision at the edge of the city is associated with land conversion difficulties and generates land use conflicts. Here, we focus on land transformation in Aligarh's PUI due to expansion of Aligarh city. Since we are focusing on city expansion, so the land transformation is confined only to immediate PUI only.

The present study is based on remotely sensed data (satellite images) combined with extensive field checks and surveys. The study was done in a GIS environment; because the use of GIS techniques coupled with remote sensing are essential

elements for an integrated evaluation map. This work was carried out using ILWIS and ArcGIS 9.1 software.

The present study is spread over 15,640 ha of land, which is much beyond the actual urban limit of Aligarh city. This extended area covers expansion of the city in all directions. From the perusal of Table 6.1 and Figs. 6.1, 6.2, 6.3, it is evident that Aligarh city has witnessed large-scale changes in land use in and around the city. The statistics show that urban area has increased from 2,257 ha in 1980 to 7,459 ha in 2010 (an increase of 230 %). Similarly, built up area has increased from 1,601.5 to 4,679 ha (192 %). All these increases are at the expense of nonbuilt up area, which shrunk from 13,882 to 10,618 ha (a decrease of about 25 %) during the study period. The city has witnessed major land use changes among classes such as residential area, an increase of 2,595 ha (261 % increase), commercial area, an increase of 184 ha (328 % increase), vacant land, an increase of 2,097 ha (475 % increase), and industrial area an increase of 85 ha (132 % increase). These changes were basically swallowed the cropland of the surrounding areas. Cropland has lost 5,448 ha (a decrease of 42 %) to the urban sprawl of Aligarh city. Among the other land use classes not much change has been observed. Area under villages has marginally reduced as some of these villages were swallowed by urban expansion. Similarly, 351.5 ha land was occupied by the Aligarh Muslim University and 17.5 ha by Aligarh fort. Both of these are located in the northern part of the study area and remained unchanged. The salient characteristics, which emerge from Table 6.1 and Figs. 6.1, 6.2, 6.3 are as followed. Aligarh city has recorded a significant increase in built up area and this is mainly because of population growth and development in secondary and tertiary occupation structure.

6.1 Land Transformation in Aligarh City and Its Environs

Land transformation is the process of identifying differences in the state of any phenomenon by observing it at different time periods. Land is in a continuous state of transformation as a result of various natural and man-made processes. The study of land transformation, therefore, requires a comprehensive understanding and monitoring of all the factors that cause the land transformation. During the study period, Aligarh city has not only expanded from its original size, but there was significant interchange of land among various land use classes. Tables 6.2–6.4 and Figs. 6.4, 6.5, 6.6, which are prepared applying G.I.S. technique, show the changes in various urban land use class of the city. These changes are because of the development of city resulting in increased demand of land for residential, commercial, industrial purposes, and so on. This demand of land along with site attraction, functional convenience, functional magnetism, and the land value of that particular area ultimately influence the pace and direction of urban land use change (Fig. 6.7).

The residential area has increased by 2,595 ha, capturing land mainly from agriculture (2,104 ha), vacant land (405 ha), tree plantation (179 ha), and villages

Table 6.1 Aligarh city and its environs, area under different land uses (1980, 2000–2010)

Land use/year	Area (1980)	Area (2000)	Area (2010)	Change in area	Percentage change
Residential	994.5 (6.35)	2736 (17.49)	3590 (22.95)	2595.5	261.1
Villages	111.5 (0.71)	135.5 (0.86)	293 (1.87)	181.5	163.9
Commercial	56.5 (0.36)	169 (1.08)	240.5 (1.53)	184	328.5
Educational institutions	28.5 (0.18)	36.5 (0.23)	113.5 (0.72)	85	303
Government offices	64 (0.41)	75.5 (0.48)	133 (0.85)	69	107.8
University area	351.5 (2.24)	351.5 (2.24)	351.5 (2.24)	–	–
Aligarh fort	17.5 (0.11)	17.5 (0.11)	17.5 (0.11)	–	–
Industrial	64 (0.41)	107.5 (0.68)	149 (0.95)	85	132.8
Recreational	42.5 (0.26)	49.5 (0.31)	101.5 (0.64)	59	140.4
Grave yards	27.5 (0.17)	36.5 (0.23)	32.5 (0.20)	5	18.5
Vacant land	441.5 (2.81)	1374.5 (8.78)	2538.5 (16.2)	2097	475.5
Tree plantation	172 (1.09)	67.5 (0.43)	191.5 (1.22)	19.5	11
Agricultural land	13209 (84.40)	10407 (64.62)	7761 (49.6)	–5448	–42.3
Brick kilns	14.5 (0.09)	15.5 (0.09)	17.5 (0.10)	3	21.4
Water bodies/logged	45 (0.28)	60.5 (0.38)	109.5 (0.69)	64.5	142.2
Total	15640	15640	15640	–	–
Total built up area	1601.5	3525.5	4679	3077.5	192.2
Total non built up area	13882	11925	10618	–3264	–24.6
Total urban area	2257	5019.5	7459	5202	230.4

Note

Area in hectares

Figure in brackets are percentage of land to total land

Source Based on Aligarh city-guide map and IRS 1D Satellite Imageries

(65 ha). Residential area also lost area for commercial development (102 ha). Commercial area has increased from 56 to 240 ha gaining land from residential area (102 ha) and vacant land (19 ha) in the city. Industrial area has increased from 64 to 149 ha capturing mainly the agricultural lands (28 ha), because this development is mostly away from the city center. Plantation area has increased

ALIGARH CITY Urban Land Use (1980)

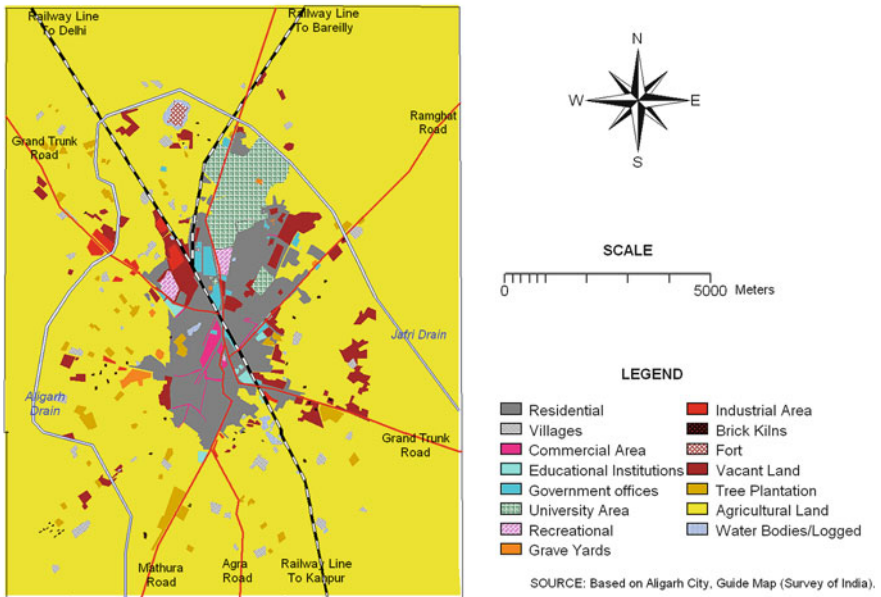


Fig. 6.1 Urban land use (1980)

marginally as significant interchange among different land use class was observed. Tree plantation lost 175 ha of its area for residential development, another 79 ha converted as vacant land, 32 ha for industrial purposes; while on the other hand, it received land from agricultural (311 ha) and vacant land (85 ha). The city has recorded a massive increase from 441 ha in 1980 to 2,538 ha in 2010 under the land use class vacant land. It captured land from agriculture class (2,798 ha) while lost area mainly for residential (405 ha) development. During the study period all the city expansion is mainly on croplands, which decreased from 13,209 to 7,761 ha resulting in heavy losses of fertile croplands.

6.2 Loss of Cropland due to Urban Expansion

India still is basically an agrarian country and any expansion in built-up or even nonbuilt-up is at the expense of cropland (mostly good quality fertile land). More over, the study area lies in the fertile agricultural tract between *Ganga* and *Yamuna* river. This area has one of the best physical conditions for agricultural activity in the country. Therefore, any loss to agricultural land here can have far reaching implications. The present study focuses on this phenomenon where cropland is

ALIGARH CITY Urban Land Use (2000)

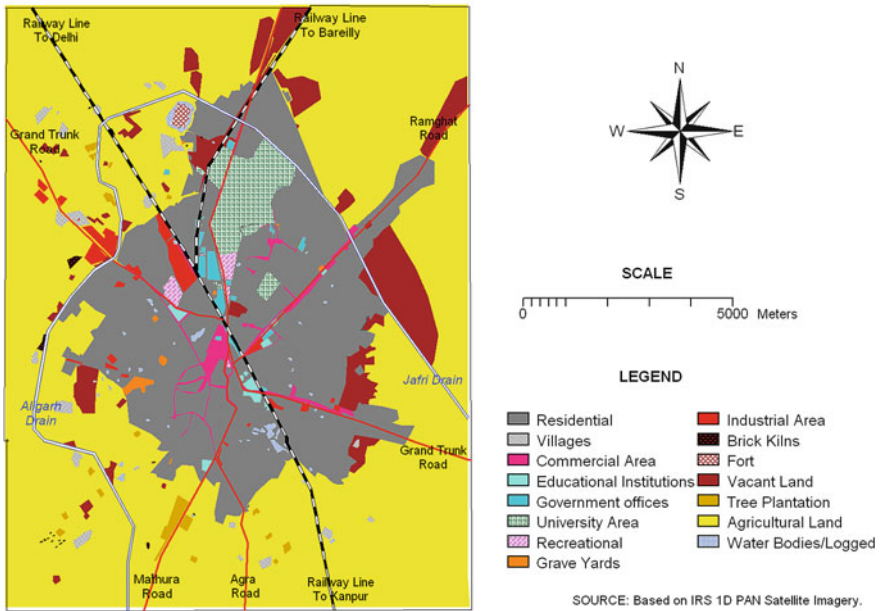


Fig. 6.2 Urban land use (2000)

being consumed by urban expansions. Tables 6.5 and 6.6 and Figs. 6.8 and 6.9 show that the area under agricultural use has declined substantially. There was a tremendous increase in the urban area between 1980 and 2010 (230 %) while a total of 5,448 ha of fertile cropland were lost due to the city's expansion. Tables 6.5 and 6.6 and Figs. 6.8 and 6.9 show land transformation from three main land use classes, namely, agriculture, vacant land, and plantation. Table 6.5, which was prepared using GIS techniques, shows that, of the 5,448 ha of fertile cropland that was lost, 3,109 ha are recoverable (land where no permanent construction has taken place, i.e., land transformation to plantation or vacant) and 2,339 ha are not recoverable (land where permanent construction has taken place, i.e., land transformation to residential, commercial, industrial, etc.). Vacant land suffered a total loss of 633 ha and only 115 ha are recoverable. This indicates the rapid loss of fertile cropland, much of which is nonrecoverable, because some permanent construction has been undertaken. Significantly, the land where no permanent construction has taken place, i.e., that which is mainly lying vacant, can be recovered but it will not be an easy task to restore this land back to agricultural use.

Tables 6.6 and 6.7 show losses of total cropland and food grain production. The total estimated loss of food grain production due to urban expansion in the study

ALIGARH CITY Urban Land Use (2010)

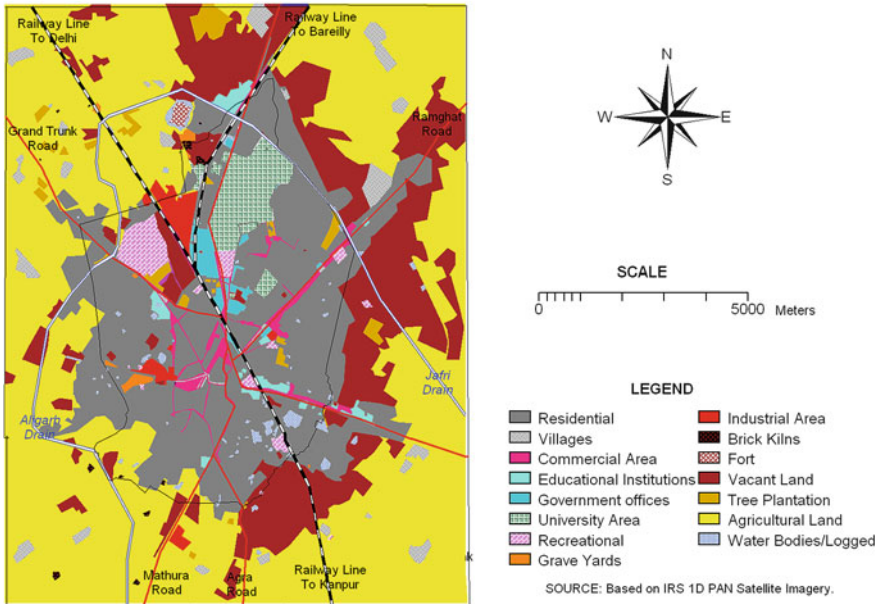


Fig. 6.3 Urban land use (2010)

area from 1980 to 2010 was about 190,680 quintals. Aligarh is expanding by about 182 ha annually. This implies that every year the loss of food grain production will increase by 6,350 quintals. If the projection that Aligarh will have around 1.2 million inhabitants by 2015 is realized and if the city continues to grow at the same rate, a further 40,000 ha of fertile cropland will be converted to nonagricultural uses. Furthermore, around 30,000 quintals of food grain annually would be lost from the study area alone. These figures clearly point to the magnitude of the problem.

6.3 Land Capability Evaluation

This peri-urban interface of developing countries, in recent times has been the most dynamic zone. Many efforts and methods have been done to understand the PUI development process. Fringe urbanization has raised new challenges for urban development policies. Considering the complex and dynamic character of the PUI, modeling is a unique tool to understand its process thoroughly and it can provide a suggestive way of exploring actual as well as optimal patterns and plans.

Table 6.2 Land transformation in Aligarh city and its environs (1980–2000)

Land use	1	2	3	4	5	6	7	8	9	10	11	12	13	Total area (2000)
	Res	Vil	Com	Edu	Govt	Univ	Fort	Ind	Vac	Tree	Agr	Water	Others	
1. Residential area	994.5	33.25							144	76	1578.5			2736
2. Villages		111.5									57.25			135.5
3. Commercial area	53.75		56.5						11		47.75			169
4. Educational institutions	8			28.5										36.5
5. Government offices	11.5				64									75.5
6. University						351.5								351.5
7. Aligarh fort							17.5							17.5
8. Industrial area								64		32.5	11			107.5
9. Vacant land									441.5	47.75	1061.25			1374.5
10. Tree plantation									21	172	30.75			67.5
11. Agricultural land											13209			10407
12. Water bodies/logged											15.5	45		60.5
13. Others (recreational, grave yards and brick kilns)													84.5	101.5

Note

Area in hectare

Figures in *bold letters* (diagonally) are area under that particular land use in 1980, while figures in the same column are shift in area to other classes and figures in same row are increase in area, captured from other land use classes

Source Based on Aligarh city-guide map and IRS 1D satellite imageries

Table 6.3 Land transformation in Aligarh city and its environs (2000–2010)

Land use	1	2	3	4	5	6	7	8	9	10	11	12	13	Total area
	Res	Vil	Com	Edu	Govt	Univ	Fort	Ind	Vac	Tree	Agr	Water	Others	(2010)
1. Residential area	2736	32							261.25	103.25	525.75		8.75	3590
2. Villages		135.5							88	43	58.5			293
3. Commercial area	49		169						8.25		14.25			240.5
4. Educational institutions				36.5					49.5	12.5	15			113.5
5. Government offices	11				75.5				27.5	12.5	6.5			133
6. University						351.5								351.5
7. Aligarh fort							17.5							17.5
8. Industrial area								107.5	24.5		17			149
9. Vacant land									1374.5	31.75	1737.5			2538.5
10. Tree plantation									64.75	67.5	280.25			191.5
11. Agricultural Land									29.5		10407			7761
12. Water bodies/logged									31		12			109.5
13. Others (recreational, grave yards and brick kilns)	17								21	18	8.75		101.5	151.5

Note

Area in hectare

Figures in *bold letters* (diagonally) are area under that particular land use in 2000, while figures in the same column are shift in area to other classes and figures in same row are increase in area, captured from other land use classes

Source Based on Aligarh city-guide map and IRS 1D satellite imageries

Table 6.4 Land transformation in Aligarh city and its environs (1980–2010)

Land use	1	2	3	4	5	6	7	8	9	10	11	12	13	Total area
	Res	Vil	Com	Edu	Govt	Univ	Fort	Ind	Vac	Tree	Agr	Water	Others	(2010)
1. Residential area	994.5	65.25							405.25	179.25	2104.25		8.75	3590
2. Villages		111.5							88	43	115.75			293
3. Commercial area	102.75		56.5						19.25		62			240.5
4. Educational institutions	8			28.5					49.5	12.5	15			113.5
5. Government offices	22.5				64				27.5	12.5	6.5			133
6. University						351.5								351.5
7. Aligarh fort							17.5							17.5
8. Industrial area								64	24.5	32.5	28			149
9. Industrial land									441.5	79.5	2798.75			2538.5
10. Tree plantation									85.75	172	311			191.5
11. Agricultural land									29.5		13209			7761
12. Water bodies/logged									31		27.5	45		109.5
13. Others (recreational, grave yards and brick kilns)									21	18	8.75		84.5	151.5

Note

Area in hectare

Figures in *bold letters* (diagonally) are area under that particular land use in 1980, while figures in the same column are shift in area to other classes and figures in same row are increase in area, captured from other land use classes

Source Based on Aligarh city-guide map and IRS ID satellite imageries

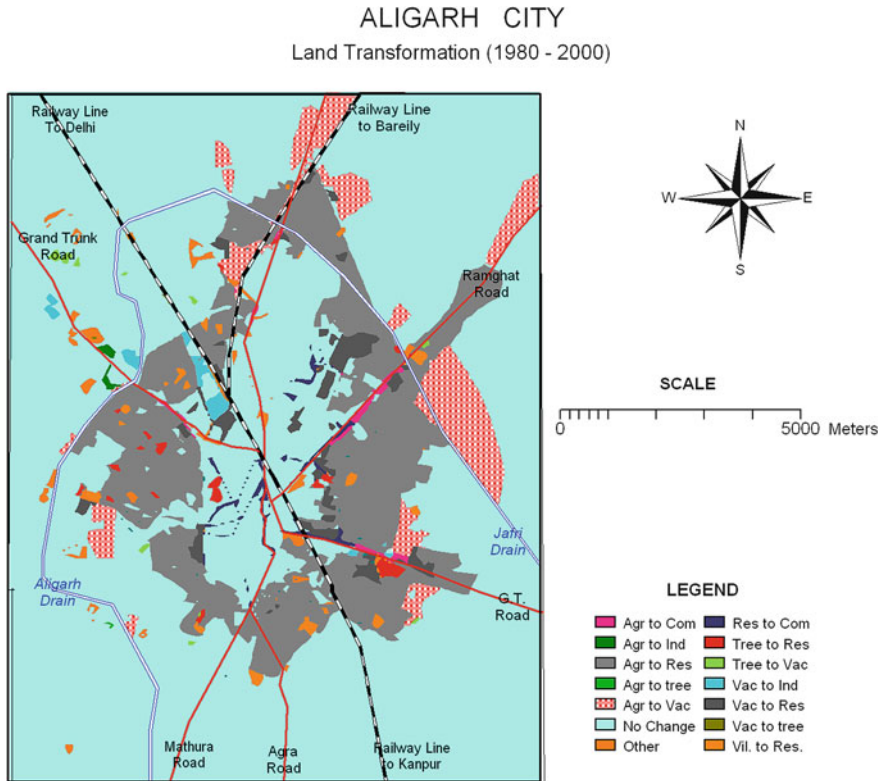


Fig. 6.4 Land transformation (1980–2000)

The present study also made an attempt to estimate the real loss of cropland and its resultant loss of agricultural production on the basis of capability of land for Aligarh’s PUI. The land capability evaluation was made on land which had been under agricultural use but which, due to urban influences, was brought into non-agricultural use during the study period. Land capability classification is an appraisal of the physical characteristics of land, its inherent soil qualities and the farm management practices (Shafi 1969). Land capability of the land was evaluated from the following indicators: distance from the city center, current and previous use of land practiced, soil fertility, irrigation potential, potential productivity of land, and land management. The maps showing these indicators were firstly assigned a capability score which had the range value of 0–10 (not suitable—highly suitable for agricultural use) this way six suitability aspect maps were prepared. These maps were further combined into a composite capability map by adding the suitability scores.

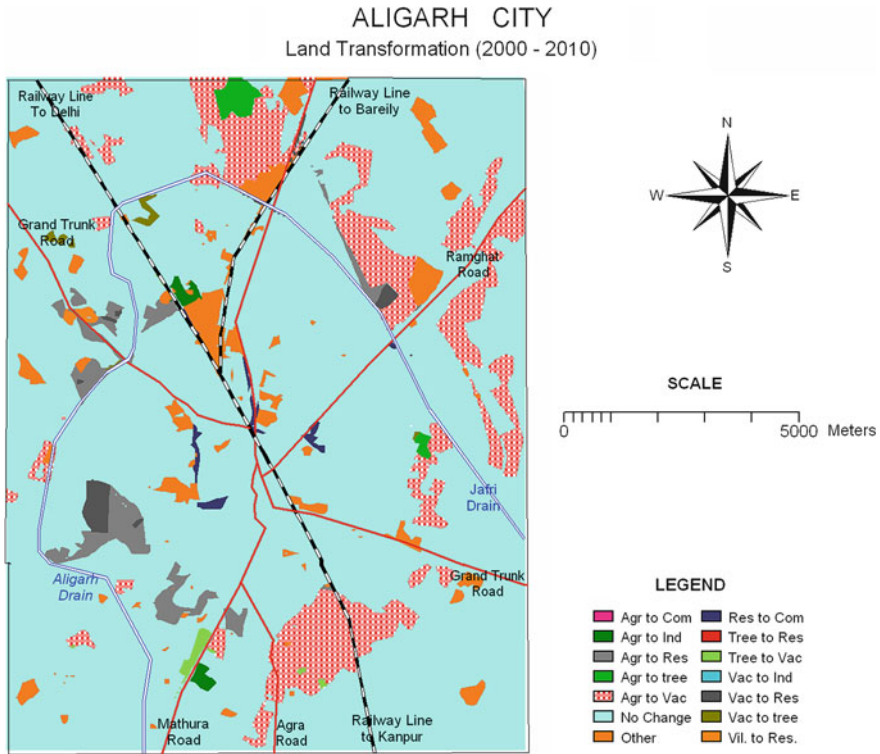


Fig. 6.5 Land transformation (2000–2010)

Box 5: Concept of Land Capability Evaluation

Land capability evaluation	Land characteristics	Potential production unit
Class I	<i>Good Quality Land</i> Highly productive when under good management	2 PPU
Class II	<i>Medium Quality Land</i> Land of medium productivity even under good management	1 PPU
Class III	<i>Poor Quality Land</i> Land of low productivity due to poor physical and management characteristics	0.5 PPU

The real loss of agricultural land can be estimated by multiplying PPU factor to the agricultural land from different land capability class.

The real loss will be **Double**, if class I land is used.
While loss will be only **Half**, if class III land is used.

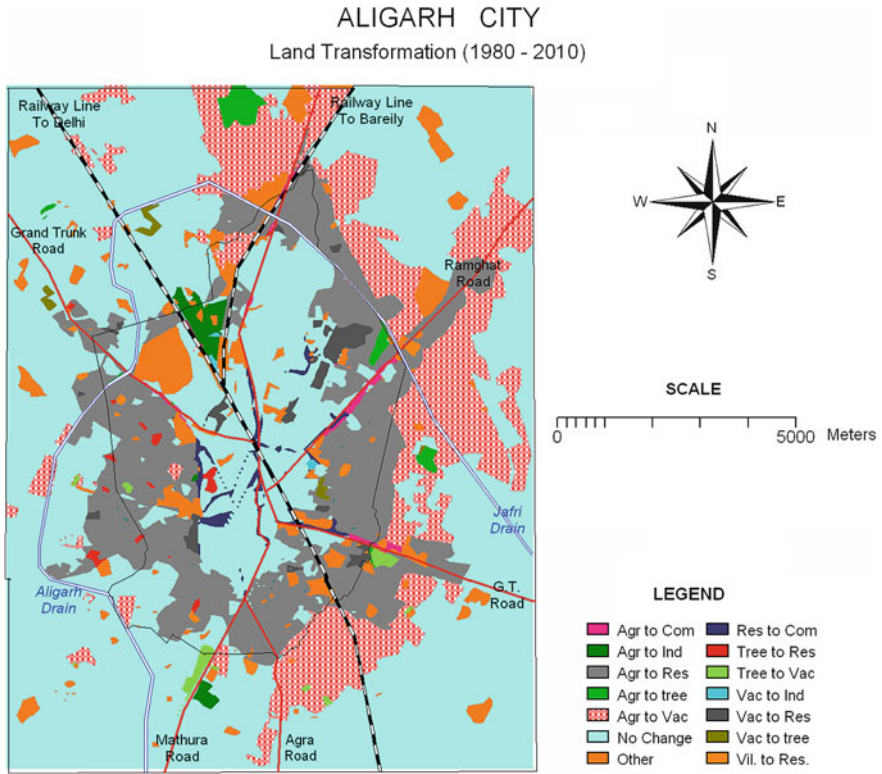


Fig. 6.6 Land transformation (1980–2010)

On the basis of these characteristics, three—‘PPU’ (potential production unit) as a standard unit for land classification was developed. A PPU is defined as the potential production from 1 ha of good average farmland under good farm management practices. The application of PPU techniques for land classification helps in assessing the real loss of cropland due to urban influences and the resultant transformation to other uses. The real loss can be estimated by multiplying the PPU factor by the cropland loss of the different land capability classes (Stamp 1962). The suggestion is that real loss would be double that of actual cropland loss if Class I land is used, whilst real loss would be only half this if Class III land is used.

Table 6.8 shows how the study area has lost 1,132 ha in the Class I land capability category, 1,347 ha in the Class II category and 599 ha in Class III. Using the PPU application, the estimated real loss of cropland is, therefore, 3,910.6 ha. Class I category land was mostly lost in the western part of the study area. More Class I category land in the south eastern area has also been converted for residential and speculative land lying vacant. Of the total loss of cropland, most was in the Class II category (1,347 ha), most of which has been converted into residential and vacant land; this was spread over the south and south eastern part of study area

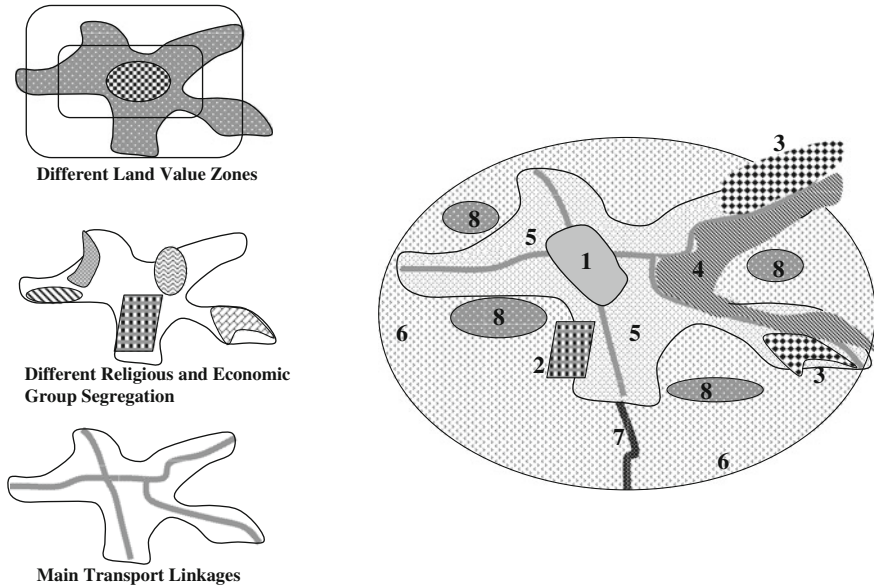


Fig. 6.7 Socio-economic urban structure model. 1 High intensity, high land value commercial and residential. 2 Planned residential (wealthy and educated society). 3 Industrial areas. 4 Squatter settlements (poor and unskilled workers). 5 Unplanned residential (mixed population representing different economic, social and religious groups). 6 New extensions (scatter and mixed land use). 7 Transformation of agricultural land to vacant land, along the main roads (speculative land holdings). 8 Vacant land or tree plantation, in between recently developed areas (speculative land holdings)

along the municipal boundary. Class III category land was mostly converted for industrial, vacant, and residential development in the northern part. This part is characterized by water logging as it is low lying. This land surrounds the university, where demand for residential land is high (Figs. 6.10– 6.13).

The present study raises three main issues with loss of cropland due to urban expansion:

1. *Urban shadow effect*: The study area has recorded a loss of 3,078 ha of cropland mainly due to urban shadow effect. Especially, the conversion of cropland to tree plantation and vacant lands are the glaring example of it. Farmers living in the vicinity of cities face problems resulting in either lowered yields or lands not farmed, even though the land is not actually converted to urban uses. Farmers of fringe areas are subject to present or short-term future development pressure, begin to devote less capital for farm maintenance and management. The productivity of the land begins to decline, which ultimately results in selling these lands to property dealers. They do not maintain it as agriculturally productive land, but allow it to remain idle until such time as the advancing suburbs justify transforming it into suburban areas. The net effect of

Table 6.5 Aligarh city—loss of agricultural land (1980–2010)

Land transformation	Area
Agriculture to residential	2104
Agriculture to industrial	28
Agriculture to commercial	62
Agriculture to vacant land	2798
Agriculture to tree plantation	311
agriculture to others	179
<i>Recoverable loss</i>	3109
<i>Non-recoverable loss</i>	2339
<i>Total loss</i>	5448
Vacant land to residential	405
Vacant land to industrial	25
Vacant land to others	88
Vacant land to tree plantation	85
Vacant land to agriculture	30
<i>Recoverable loss</i>	115
<i>Non-recoverable loss</i>	518
<i>Total loss</i>	633

Note Area in hectares

Source Based on Aligarh city-guide map and IRS 1D Satellite Imagery of aligarh city and its environs

Table 6.6 Loss of cropland in aligarh city and its environs (1980–2010)

Years	Area under agriculture (in ha)	Loss of cropland	Average annual loss	Time (years)
1980	13209	5448	181.6	30
2010	7761			

these forces cause a much greater loss of cropland to urban uses than the figures normally given for land transferred to urban uses indicate. It is estimated that for each hectare of land actually transferred into an urban-related land use, almost 2 ha of additional land is lost from agricultural use (Fazal 2001).

2. *Quality of cropland converted*: Not all land is equally suitable for farming purposes. In India especially in Indo-Gangetic plain region, almost the whole land is flat, well drained, adequately watered and fertile land, which makes it very suitable for agricultural activity. But these same characteristics also make it a prime land for the development of the settlements in this region. The study area also recorded conversion of 36.7 % of prime land with Class I land capability class indicative of the disproportionate concentration of development on good quality cropland. The significance of this is obvious. Lands in Class I yield a much higher return for the same inputs of labor and capital. These are the lands which are of primary importance in maintaining the agricultural productivity.

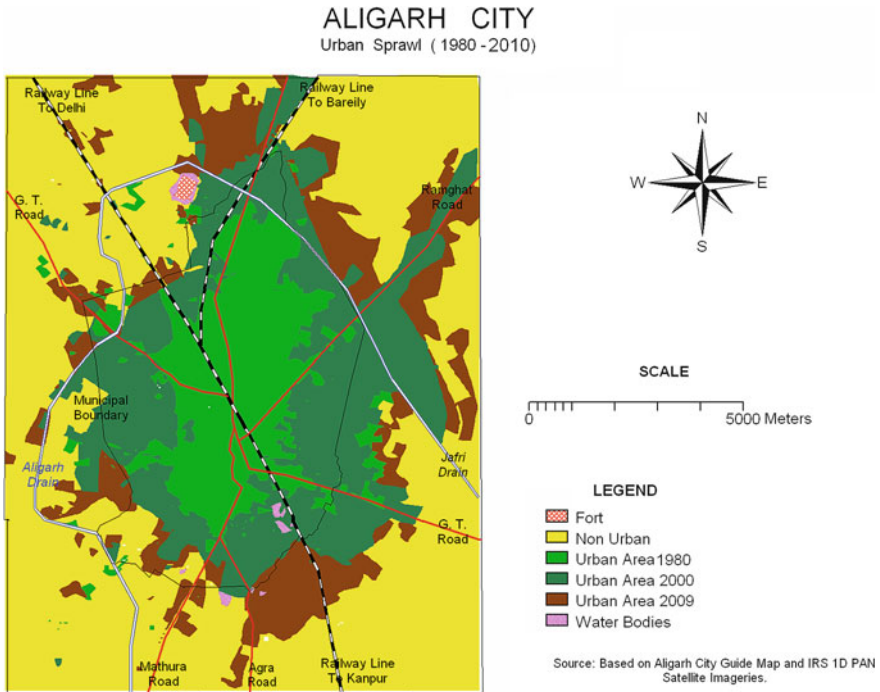


Fig. 6.8 Urban sprawl (1980–2010)

3. *Cost of cropland conversion:* A more significant factor intensifying the problem of loss of prime cropland is associated with the cost of such land conversion. These costs are twofold, and are related to the actual cost of replacing the lost farmland, as well as to government programs that prompt urban expansion and encourage loss of cropland. When the prime farmland is lost, the value of the crop production is immediately foregone. The cost to replace that land is fairly substantial. The government makes effort to bring some additional land for agricultural uses by reclaiming wastelands but the question is “how much and at what cost”.

Above all when agricultural land is lost due to urban expansion, in most cases most viable livelihood option of the farmer is also snatched away. This loss can not be compensated as agriculture is a way of life for population at least in north Indian plains (Fig. 6.14).

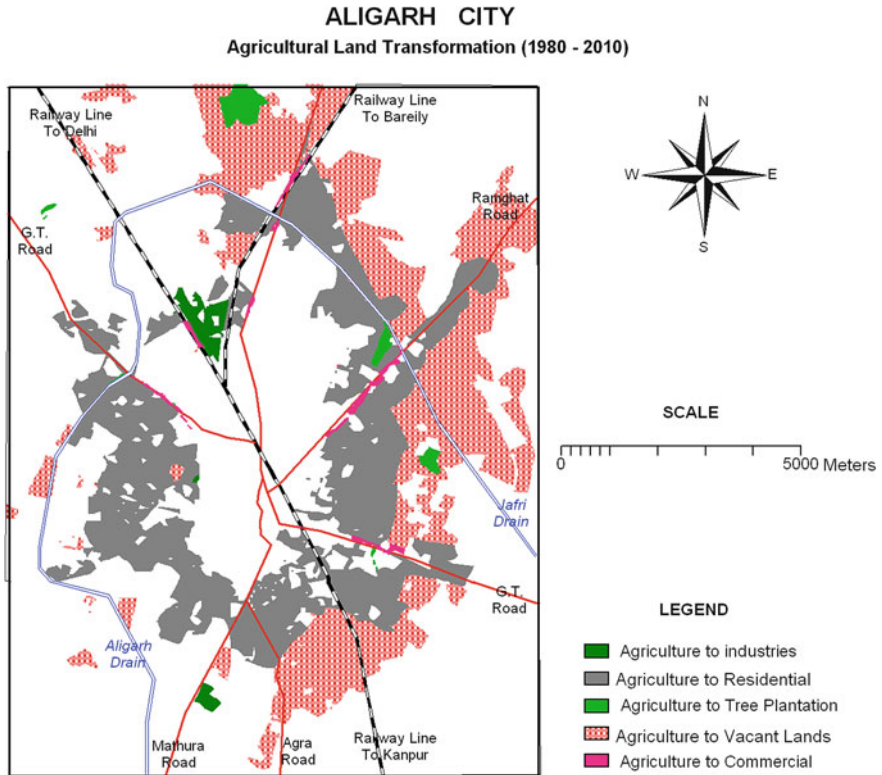


Fig. 6.9 Agricultural land transformation (1980–2010)

Table 6.7 Estimated loss in food grain production in Aligarh city and its environs (1980–2010)

Years	Food grain production (Quintals)	Loss in food grain production (Quintals)	Average annual loss (Quintals)	Time (years)
1980	462315	190680	6356	30
2010	271635			

Table 6.8 Actual loss of agricultural land on the basis of *land capability evaluation*

Land capability class	Area (ha)	Potential production unit	Actual loss of agricultural land
Class I	2102	2	4204
Class II	2447	1	2447
Class III	899	0.5	449.5
Total	5448	–	7100.5



Residential complexes have spread away from city avoiding congestion



Apartment complexes are coming up in the city outskirts



Cold storages are commonly found in the city outskirts

Fig. 6.10 Aligarh's PUI agricultural land is extensively used for urban development



Commercial malls are coming up in the city outskirts



Public schools have large campuses in the city outskirts



New institutional establishments are also build away from city congestion

Fig. 6.10 continued



Land is acquired for future extension of academic institutions



Land is transformed for future residential development



Agricultural land is used for urban expansion



Land is protected from encroachments by putting labour on prime land temporarily



Urban developers transform vacant land by infrastructural investments and inflating the land value

Fig. 6.11 Aligarh's PUI Land is in great demand and large scale speculative land (vacant land) characterizes land transformation

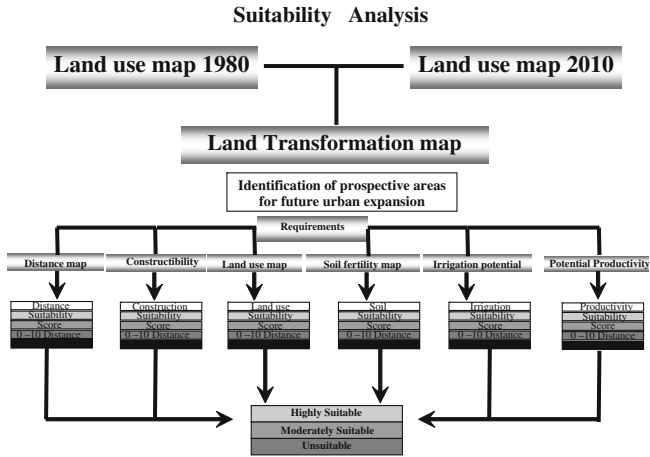


Fig. 6.12 Flow chart for suitability analysis

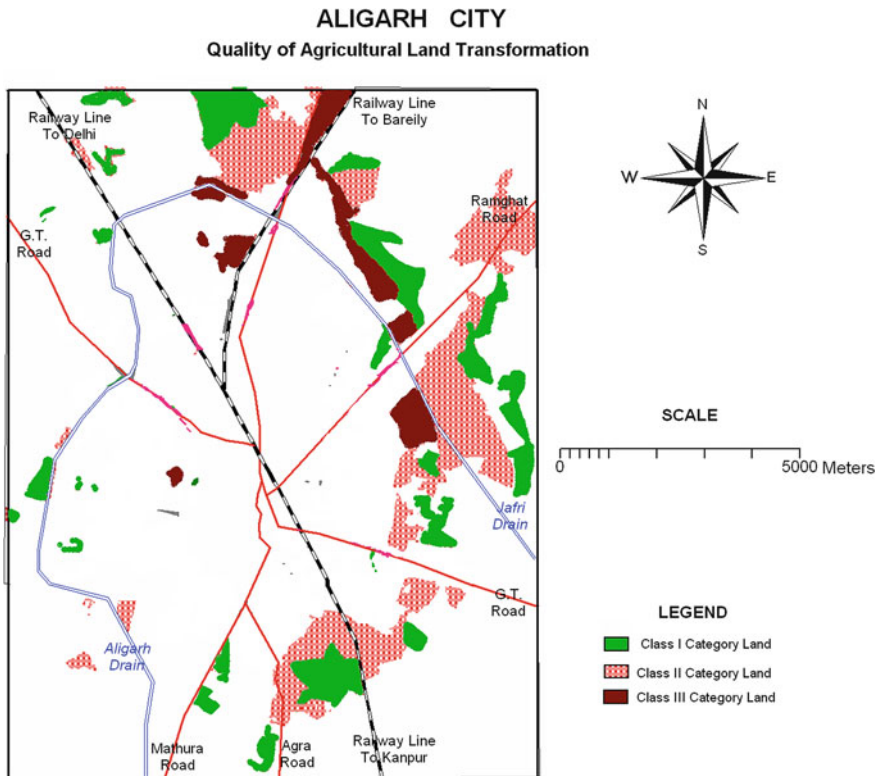


Fig. 6.13 Quality of agricultural land transformation



Soil excavation makes depressions where rain water is accumulated



Abandoned brick kilns



Water logging in disused brick kilns



Garbage is dumped on vacant lands



Vacant lands are deserted till its value increases

Fig. 6.14 Aligarh's PUI urban land transformation often led to land degradation

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Chapter 7

Factors Influencing Land Transformation

Land transformation is a complex phenomenon. It is the outcome of interrelationship of different social, economic, natural, cultural, and even political situations. The study further tries to investigate the factors which were influencing the land transformation in the PUI.

Pressures and changes in the PUI are being driven by a combination of urban and rural forces. With rapid social and economic changes, the PUI is under increasing threat, and as a consequence, appears more precious than ever before. In terms of urban development patterns and trends, the PUI is a pressure point, residual element, and container for urban structures. Urban fringe landscapes are by their nature zones of rapid transition and change, where new land uses need to be accommodated while previous ones become dysfunctional (Table 7.1).

This study also tried to study the landowner's decision-making process. Decision about the use of land involves a multiplicity of factors: the objectives of land user, the process by which he reaches on the decision and the socio-economic factors that consciously or unconsciously influence the decision, and above all the proximity of the growing urban center too exerts pull force. The sample survey was conducted on 52 households, where land transformation (agriculture to other uses) has taken place. The sampled landowners were divided into three categories on the basis of disposed land holdings by them.

- Large: landowners disposed off more than 2 ha of agricultural land.
- Medium: landowners disposed size off 0.5–2 ha of agricultural land.
- Small: landowners disposed less than 0.5 ha of agricultural land.

To know the factors, which lead to their decision of disposing off agricultural land, land owners were asked to state the reasons for their decision. Their answers were then arranged in descending order (Table 7.2). The factors which were affecting the decision-making process of the sampled land owners are discussed below.

Table 7.1 Aligarh PUI—sampled land owners disposing land

Land owner category	Size of land disposed off	Number of sampled holding	Total land disposed off (ha)	Average land disposed off (ha)
Large	Land disposed more than 2 ha	16	46.5	2.9
Medium	Land disposed 0.5–2 ha	25	30	1.2
Small	Land disposed less than 0.5 ha	11	5	0.4
Total sampled land owners		52	81.5	

Source Based on field survey, 2009–2010

7.1 Change in Employment

Urbanization has generated employment opportunities with increased and assured wages and land owners with better education have obtained jobs outside agricultural sector. These farmers, if their family allows, are quick to dispose off their lands to get extra money. Land owners from large (34.8 %) and medium (26.6 %) category were found to be disposing their lands because of change in economic activity.

Box 6: Law for Land Rights

Land in India is generally inherited in the family, which is divided among son and daughters in different proportion (variation is found in different religion, caste and regional traditions). The division of land is mostly not properly documented and is rather verbal. It leads to conflict among the family members. Sometime these conflicts extend among families from different generations. Another issue related to this division of land among the family members is shrinking of land holding. This lead to transformation of land holdings into uneconomic land holdings within a period of few generations. In India, where *law of inheritance* prevail, reduction in the size of operational land is adversely affecting agricultural activity.

7.2 Instant Money

Agricultural activity is a depressed activity; the cost of production is increasing and the profit margins are stagnant. The small (27.5 %) and medium (20 %) land owners with relatively poor economic conditions are disposing off their lands to

Table 7.2 Aligarh PUI: reasons for disposal of agricultural land among sampled land owners

Land owner category	Reasons for disposal of agricultural land	C.E.	S.S.	U.P.	O.P.	I.M.	P.F.	U.L.	FR.
Large (land disposed off more than 2 ha)	Reasons	C.E.	S.S.	U.P.	O.P.	I.M.	P.F.	U.L.	FR.
	Rank	1	2	3	5	6	7	8	8
	Land owners	8	5	4	4	4	3	—	—
Medium (land disposed 0.5–2 ha)	Reasons	C.E.	P.F.	I.M.	S.S.	U.P.	O.P.	U.L.	FR.
	Rank	1	2	3	4	6	7	8	9
	Land owners	8	6	6	6	5	4	1	—
Small (land disposed less than 0.5 ha)	Reasons	I.M.	FR.	U.L.	U.P.	O.P.	C.E.	S.S.	P.F.
	Rank	1	2	3	4	6	7	8	9
	Land owners	8	5	4	2	1	1	—	—
Total	Reasons	C.E.	I.M.	U.P.	S.S.	P.F.	O.P.	U.L.	FR.
	Rank	1	2	3	4	6	7	7	8
	Land	17	17	12	11	10	9	5	5
	owners	(32.6%)	(32.6%)	(23%)	(21.1%)	(19.2%)	(17.3%)	(9.6%)	(9.6%)

Note Based on field survey (2008)

Figures in brackets are percentages to total respondents. These figures are more than the total respondents as more than one reason were pointed by the respondents

1. *C.E.* Change in employment
2. *I.M.* Instant money
3. *P.F.* Protecting future
4. *S.S.* Social status
5. *U.P.* Uncertainty of profit margins
6. *O.P.* Operational problems
7. *U.L.* Uneconomic landholding
8. *Fr.* Forced

get instant money. These farmers get some labor-oriented jobs in the city and they dispose off their lands. The disposal off land is basically because their lands are not productive enough to sustain their family needs, so their entire family does work in city in different capacities while low productive lands are sold to get instant money.

7.3 Uncertainty of Profit Margins

Uncertainty of profit margins in the agricultural sector due to variation in natural—social—economic conditions also led to land transformation. The urban shadow effect has led to lower productivity, resulting in lesser priority to agricultural activity. Large (21.7 %) and medium (18.4 %) farmers were found to be disposing off their lands because of this reason.

7.4 Social Status

The urban forces have transformed the social- cultural mindset of the population. Owning agricultural land was once considered to possess higher social status but now social status is higher for jobs in urban area because of the higher wages. Again the large (21.7 %) and medium (20 %) land owners were found to be disposing off their agricultural land and disassociate themselves from rural connections. The younger population is found to be more responsive to this factor.

7.5 Protecting Future

Economic returns from the agricultural sector are lower and protecting agricultural lands from encroachment and litigations is difficult. So the landowners dispose off their land when real estate prices are high and try to protect their future. The large and medium land owners who either have jobs in other sectors or feel no future in agricultural sector dispose off their lands and invest it in other sectors. Another reason which contributes in selling their lands is the tradition of joint land possession, the landowners also dispose land to avoid family dispute and get whatever money they can get which may not be possible if the dispute for division of land happens.

7.6 Operational Problems

Due to urban shadow effect, land owners face several operational problems in agricultural activity in the peri-urban interface. Garbage dumping, unauthorized traffic, interfering with water troughs, vandalism, and higher labor costs, etc., are the common problem in farms close to urban settlements. Large land owners were worst affected by this problem due to lack of labor and management in their farms and this also led to disposing their agricultural land.

7.7 Uneconomic Landholding

Small land owners are unable to sustain their family from the small, uneconomic land holding so they dispose their land. The cost of production is high while the returns are lower. The small landowners work as laborers in the unorganized sector of urban center and dispose off their unproductive, uneconomic lands.

7.8 Forced

Property dealers and land developers pressurize small land owners to dispose their land as these people need big areas for developing colonies. Small land owners because of their poor economic and social background could not resist the pressure and are forced to sell their agricultural lands.

The sample survey shows that unlike the agricultural sector, all sections of the society belonging to different categories of landowners were observing the pressure of urban forces in the peri-urban interface. But their responses to urban forces were different because of different economic and social background.

Large land owners (out side agricultural sector) were found to be more responsive toward the urban forces. The reason was that they have distanced themselves from direct agricultural activity. This poses managerial and operational problems in farming activity; thus, they are offering their lands in the fringe areas for urban development.

Medium land owners were found to be resisting to urban forces out side agricultural sector. Socially, this section of the society still associate themselves with farming community, but since they are also the progressive and dynamic section of the society, they change occupation and this instigate them to dispose off their agricultural lands.

Small landowners are also responsive to urban forces for disposing off their agricultural land. But their decision is more due to their poor and miserable economic background. They are unable to sustain themselves in agricultural sector and the lure of getting instant money goads them to sell off their agricultural lands.

Chapter 8

Actors and Their Role in PUI Land Transformation

Aligarh despite a relatively small city is experiencing an extreme amount of pressure on land. Many studies have highlighted this trend as it has been found in other Indian cities, like Schenk (1997) observed unauthorized development in and around the city of Bangalore, stating that “developers in Bangalore provide for a temporary, makeshift building on their land and invite a squatter family to come and live there for the time being and act as a guard to protect the owner’s rights against other squatters”. Similarly, Kundu (1997) expresses concern about the poor service levels in the periphery of Lucknow, where there are many unauthorized colonies as well. The sales prices and rents for dwellings in colonies on these examples are much higher than in Aligarh. Nevertheless, the same mechanism and pattern of urban expansion is witnessed in Aligarh city also although the scale may vary.

Traditionally, the master plans for cities in India have been for the containment and reduction of population pressure but lately, urbanization has met with increasing approval. The proponents argue that cities create an efficient multi-opportunity environment for the rapidly growing populations in India: “*The...increase in the density of population will reduce the per-capita cost of providing various services to the people. Therefore, the growth of urban centres must be welcomed and the emphasis of policy and public investment must shift towards minimising the unfavourable aspects of urban growth and removing critical bottlenecks*” (Visaria 1997, p. 286). Due to the continuing influx into the city and the fact that government institutions do not reach the targets they set for land and housing supply, the privatization of a large part of the sector seems inevitable.

The present study also finds that the demand for land is high which results in informal urban development fulfilling the requirements of many of the city’s residents. Every piece of land is a tradable commodity, and the pursuit of short-term profits is the predominant ethic. Yet there are some problems related to the unauthorized status of the settlements. The amenities are overburdened, access routes are encroached upon and the system is corrupt and unreliable as cheating as well as extortion and intimidation to protect the influential people’s interests are common. The formal planning aggressively violated, resulting in conflicts which

leads to crimes and lengthy legal battles in court. Moreover, this kind of expansions (development) ultimately reflects city more as large village rather than a city (Fazal 2001).

The present study points toward prevailing duality in the system of land supply, which is characterized by many current urban concerns:

- there is a chronic shortage in the supply of urban land.
- there are problems with the provision of services and infrastructure and the coordination of site servicing with the construction of housing.
- all the amenities and facilities do not match to the requirement putting extra load which is evident with their poor status.
- every individual has different interests which lead to conflicts and practices of intimidation and manipulation to defend certain interests are widespread.
- there is excessive inter-mixing of spatial functions which is the result of unrestricted, uncontrolled expansions, causing adverse environmental conditions. This problem needs to be addressed, but the costs of relocation are high and the legal proceedings are lengthy.
- the chaotic development leads to pockets of very high population densities, clogging the access roads. The unauthorized construction and encroachment leads to congestion on roads which are not wide enough to sustain the traffic accompanying such high intensities of inter-urban transport.
- the poor cannot afford the high prices and rents resulting from inadequate land supply. In the absence of enough formal housing that is affordable to the economically poor section of the population, people opt to squat on public spaces, thereby creating slums. This is also found to be one of the reasons for male specific migration to city.
- the poor are keen to save money on accommodation, therefore, they tend to opt for a low-cost hut in a slum-like settlement. Local industry requires labor for both day and night shifts. Considering these people's nature of work and monetary budgets, it is rather difficult for them to commute long distances.
- the speculative land holdings also encourage people to settle temporarily. This benefits the land owners in protecting their land from illegal or forced encroachments and the migrant settler gets place to squat. However, this kind of arrangement is temporary and only till the land is developed.

Many researchers and planners have investigated the drivers of change in land use and land cover. These changes are the result of broad economic, socio-cultural forces bringing in land use, and changes or transformation in land. Identifying the causative factors requires an understanding of human behavior, their decision-making process, and interaction with biophysical settings and changes therein. These forces can be differentiated into two forces:

- driving forces
- conditioning forces

The driving forces—that are expected to change over time, such as increase in population, land value, etc. These are fundamental forces that underpin the direct

circumstances for land transformation. The driving forces are the outcome of complex interactions among social, economic, demographic forces. Driving forces operate more diffusively (i.e. from a distance) and often have bearing over stable conditioning forces.

The conditioning forces—remains relatively stable over time but may be spatially varied, such as physical setting or even cultural values. The conditioning forces involve physical actions in land transformation, impacting at local levels (such as individual holdings, local residents, or society, etc.).

Both of these forces, driving, and conditioning have bearing on spatial and temporal variations in land transformations at different locations. Bryant and Bailey have used the term ‘actors’ for the individual components of driving and conditioning forces (Bryant and Bailey 1997). The trends and pattern of land transformation at any location are the outcome of certain ‘alliances’ and ‘conflicts’ among these individual actors. The actors in PUI are even stronger because it is characterized by intermixing of rural and urban activities and interests as well as the number of actors are greater than in any other area.

8.1 The Different Actors Operating in Aligarh’s PUI

The land use and their transformation take place because of the interest of different actors. The study finds that the city is expanding, there is large-scale transformations from non-built up land to built up land. There are arguments that the changes are not because of purely geographical factors like distance or land rent. But these changes are also due to changes in economic, social, or cultural environment. The study finds that land use and transformation in Aligarh’s PUI are the outcome of different actors driven changes. There are number of actors active in the land transformation process and some of the dominating actors and their role are discussed below.

8.2 PUI Farmers

Land-owning farmers are the beneficiaries of agricultural land on the production side. They are the representatives of agricultural interests, although many of them may not be entirely dependent on agriculture. They have diversified their economic activities and thus have multiple interests, both as individuals and within the context of their household, which result in strategies that may or may not give priority to agriculture. The pursuit of multiple objectives influences the farmers attitude on land transactions, but this greatly dependent on the distance from the city. Whether a landowner is eager or reluctant to sell land depends mainly on his ability to find other occupations and his ability of investment for the household.

Even if the farmer withdraws from agriculture as an occupation, he may keep the land for speculative purposes.

Politically, the original farming community in peri-urban interface is significantly influential, at least at their own local level. They belong to the area, having lived there for generations. They have access to different institutional and governmental agencies and many of them also have the financial resources to protect their interests. In private land transactions, the farmers are in a position to take a good share of the profits. The terms of trade are mainly dictated by powerful property dealers. Nonetheless, the pressure sometimes applied by large property dealers in association with locals does intimidate the local farmers. They can usually count on the backing of the dominant community in the village, which is an important force. Therefore, the predominating interests among the village population are definitely a consideration when a farmer has to decide what to do with his land.

In the context of peri-urban interface of Aligarh city, age and education have played significant role in land use and land transformations. But more strikingly, these transformations within social classes have led to upliftment of backward and deprived classes in general. Non-economic factors also play significant role. Some farmers mostly older people feel a strong emotional attachment to their land. The cultivating castes have had ownership of ancestral land for centuries. Their tie to the land has determined their lifestyles, habits, and occupational preferences, whereby social status can be at least as important as economic gain. The farmers often raise the issue of emotional loss and livelihood and thus resist sale of land. But this bounding is strong away from the city and weak close to the city. Most certainly, the youngsters belonging to the original farming community become indifferent to the role of land for social status. As they are increasingly involved in the urban economy, they derive more status from typically urban activities and assets. This process clearly creates an incentive to sell off agricultural land.

There is a smaller group of farmers who do not own the land but they cultivate. Most of them are poor who earlier worked as rural laborers now they lease-in land from local landowners (who have abandoned farming activity but holding their lands). Lease contracts are usually arranged on a yearly basis. Nowadays, most leases stipulate monetary compensation (the leaseholder pays a fixed amount to the owner). In some cases, the land is cultivated on sharecropping basis also, whereby the landowner and the cultivator share the cost of the inputs and the revenues from the harvest. This form is chosen when the leaseholder is poor and cannot raise the funds to pay the amount for lease and inputs beforehand. The risks for the cultivator are lower, but so are the revenues. An increasingly common form of agricultural contract is lease by the land owners living in urban areas. These urban farmers are outsiders (living in city) with sufficient resources to lease land at various places, to hire workers, and to market the crops themselves. They specialize in high-value seasonal crops, such as vegetables fruits, flowers etc. and are highly mobile.

Landless laborers also constitute a large group and they are also important actor. Obviously, they depend on the availability of agricultural land, but they are

not farmers, they work on other people's land for wages. Most of these agricultural laborers are highly mobile seasonal migrant workers, they come back to the village during harvesting or sowing season and during lean season they are associated with nonagricultural activity in the city. This practice helps them to take advantage from both rural and urban economies. These unskilled workers have taken advantage of the city to sell their labor and in return assure of remunerations.

The landowners in the PUI (whether practicing farmers or merely owners of land) are in dilemma. The returns from land are not satisfactory in farming activity so they are willing to dispose of their lands (they may get good returns instantly as the value of land is more in non-agricultural sector). But land values are greatly varied and dependent on various factors. Thus the landowners are holding on their land for appropriate time and value.

8.3 PUI Residents

The PUI residents are also an important actor in PUI land market. They play a dominating role in land transformation at local level. Especially, their role has bearing on the pace and direction of land transformation.

The local population can be divided into three groups:

- the local land-owning residents
- the local landless residents (the tenants)
- outside settlers.

Besides this these residents also play other roles too: as farmers, residents, entrepreneurs, industrialists, as speculators, or even as political representatives and government employee. People are mainly concerned about acquiring residential space and improvements in levels of amenities and infrastructure in their locality.

Households among the original population often want to obtain additional land for residence, and there are two reasons to do so. First, families are growing and thereby splitting into separate households, for which additional housing is required. Second, the development of commercial and industrial activities in villages provides an incentive for the villagers to start businesses or other activities in part of their dwelling space. Alternatively, they rent out space to others also for that purpose; this is more likely when their residence is located along the roadside. As a result of these actions, people have to look for alternate place to live. Some original households have trouble acquiring sufficient space for housing; this is especially common among the poor section of the population. The inflated land prices make it difficult to buy additional land from the free market.

Outside settlers, the great majority of whom are migrants (AMU and other employees who draw livelihood from tertiary sector constitute a large majority of it), creates demand for space differently. They do not originally belong to the same locality, but may have spent some time there. Therefore, as individuals, they do not have much influence or powerful connections. Some find rented accommodation in

the peri-urban interface itself, but most reside in colonies which have been built upon the former agricultural fields. They want to reside close to university (work place) as well as close to market and other social and cultural amenities and facilities. This way they cut down on their travelling expenses. There is one more important reason, because Aligarh city has history of communal disturbances so the residents settle within their own community and comfort zone. They have other priorities also, first, they prefer relatively cheap accommodation. Second, if the colony is unauthorized, they look for official assurance on legal status for the settlement. Third, they pursue for the government to invest in the public amenities for their colonies. Individually, the poor settlers are not very influential, but their power lies in their large numbers. Political parties and representatives champion their cause to gain their votes during elections. This kind of political patronage is common all over urban India.

Members of the original population sometimes complain about the dilution of their political representation. When a village becomes urbanized, the original villagers become out-numbered by migrants residing in the (newly built, mostly unauthorized) colonies. Previously, when the village was still in a rural setting, their say in elections were significant but with urbanization, this has changed and educated elites have displaced them and the interests of original people are ignored. In recent times migrants dominate in number and their interests are imposed upon original population. However, it is not always a contest between migrants and original villagers. The village population also includes land developers or landlords, many of whom are in politics as well. Often the migrants opt for a local village candidate because they expect better contacts within the governmental institutions. The villagers earn from the migrants through rent and retail. The whole population stands to gain from legalisation of an unauthorized colony through higher land prices and better infrastructural provisions. Generally, the authorization of a colony is an issue that enjoys the support of the original population as well as the migrants. Besides, within every village there are (historical) rivalries, which are expressed in conflicting economic and political objectives. This also reflects in land, its use, and transformation.

8.4 Entrepreneurs

Private entrepreneurs have an important role as actor in urban land market. They represent the demand side of the land market, as they require space for commercial and industrial activities. At more peripheral sites in the agricultural area, brick kiln owners, sand excavators, etc. are also strong actors, initiating changes on the land. They place a strong temporal claim on land as leasing of speculative land is common feature of this activity. Some of these kiln owners and operators are from the original land-owning communities in the villages. The majority of them are specialized entrepreneurs who come from the city and share land resource with local community.

The pressure on the land increases closer to the better-serviced and accessible areas along the roadsides and near the villages. The greater demand leads to conversion of farmland for industrial and commercial purposes. In general, the supply of land by the government for commercial and industrial purposes is too limited. The majority of land in the market is being controlled by informal sector. Owners of industry, cold storages, storehouses, and other commercial activities on former agricultural land come almost exclusively from outside the village, although many holdings are still owned by original villagers. The latter tend to concentrate on less space consuming activities such as retail businesses and repair shops within the residential areas.

Entrepreneurs tend to work closely with local property dealers, especially in unauthorized operations. The property dealers negotiate the transaction, keep the authorities at bay, and keep an eye on the property if the transfer of title does not result in the intended new use. They also combine some speculative venture with other land uses such as plantations and orchards. In fact, most of the vacant land in the study area is kept for speculative purposes. Local farmers, developers, and even entrepreneurs engage in this practice.

Land is an attractive investment object due to the escalating land prices in the peri-urban interface. The owner is obviously waiting for a more profitable use to come his way or for a buyer who is prepared to pay a higher price. In many cases, speculation is mixed with other intentions. Certain land uses are actually meant to conceal the main goal, which is speculation. For example, while waiting, the owner may build a farmhouse and keep a plantation or construct a marriage hall till it comes within residential limits with higher value. Adjoining land may be used for agriculture despite being sold to speculators, who let the former owner or leaseholders cultivate it until they need the land.

8.5 Property Dealers

Property dealers are involved with both the supply and the demand side of the land market. The majority of them are outsiders, although some are original villagers too. There are enormous monetary benefits connected with the development of land into residential, commercial, and industrial premises. Property dealers have access to the most detailed local information on the legal status, ownership, prices, and landowners who want to sell land. They occupy the space in land market to fill the gap left by the government in areas where the formal control of development is weak. They have a captive market in the large number of migrants who are looking for a place to stay or own. This seller's market is good for their business. The demand created by industrialists, speculators, and city dwellers is another important source of earnings, as the property dealers charge commission on the transaction. These property dealers also involve local goons into their deals and transactions. Since, the stakes and profit margins are so high and these goons tilt the balance for the property dealers. Quite often, the land belongs to multiple

owners and even one owner decline to go with other owners, the transaction is affected. In these situation the goons act to benefit property dealers.

Some of the former and current landowners from the indigenous community are property dealers as well. They have an advantage over the outsiders due to the solidarity between the land-owning group in the villages, their knowledge of the land issues, and their ease of movement in the social structures of their village. However, that as the village becomes more and more urbanized and the real estate sector expands, the community loses some of its coherence. This causes the community to lose its grip on the property business. There are reports of dubious role and complaints of property dealers in land transactions and conflicts about land and criminal acts in the land business. This job is being favored by large number of people at different level because it does not require much investment, it is possible for local people to enter the real estate business and do well, taking advantage of their familiarity with the residents and the local setting.

8.6 Developers

Developers are group of people with a strong financial strength and political contacts. They usually act in a group which consists of local villagers, property dealers, developer, and investors being helped by governmental and political people from behind. Many of the developers actually are politicians, making optimal use of the power and information they acquire through their office. Some of them are local villagers, but most are wealthy urban businessmen. They are in a good position to orchestrate the development of unauthorized colonies. The activities of developers in the study area are mostly illegal, they forge the land records and manipulate the development plans for their benefits. Many of the property dealers have become developers due to the knowledge of land market and its operation mechanism. However, the developers do not have good reputation of the population as they cheat the people at different stages of property development. Since the stakes are very high, often criminal or financial conspiracy also involved.

Box 7: Decentralization for Rural–Urban Development in India: Enabling Legislation for Rural–Urban Problem Solving

The Indian government made amendments to its constitution in 1992 that lay the legislative basis for addressing some of the most difficult challenges to rural–urban environmental problem solving. Legislative factors often limit the power of different local governments to take the initiative to solve local problems and to collaborate to address mutual problems.

The Indian government has made several changes, which allows local governments to transcend some of the limitations in terms of decision making by specialists using mostly technical criteria, lack of access to finance and the legal leeway to raise their own finance, and political considerations for delineating municipal boundaries:

1. Municipalities were made responsible for economic development and social justice in addition to the conventional municipal functions. In place of agency led land use planning, municipal and elected bodies would now be directly involved in matters related to rural and urban planning diffusing a share of the decision making from specialists into the hands the people and their elected representatives.
2. This requires that municipal areas shall be declared on a greater consideration of other factors, including population area and percentage of employment in non-agriculture.
3. This approach provides that every State should constitute a Governance Board for transitional areas—areas in transition from rural to urban—or the urban fringe in order to manage rural–urban interaction and problems of land use at the fringe.
4. Local governments can achieve financial self-sufficiency through proportional access to state taxes, grants in aid to municipalities from the Consolidated Fund of the State, locally raised taxes, user charges, non-tax revenue for performance of statutory and regulatory functions, from commercial ventures, and borrowings. These mechanisms aim to ensure that local governments have the necessary financial base to address their priorities.

This legal framework allows for a greater balancing of spatial, national, regional, and local priorities, allows more information to flow from the local to regional levels, and allows national rural–urban priorities to be grounded in local reality. Under this system, Municipalities and Panchayats prepare development plans, which are reviewed by District Planning Committees, which consists of locally elected representatives. These Committees consolidate the plans and prepare a Draft Development Plan for the district as a whole. The draft development plan is prepared with respect to matters of common interest, such as spatial planning, sharing of water and other physical and natural resources, and integrating development of infrastructure and environmental conservation. These plans are then forwarded to the State Government for approval. This potential of flow of information from people to policy makers can only become a reality if local governments take the initiative and use the doors that have been opened by these legal reforms.

8.7 Government and Public Institutions

The government enters the scene in many guises. There are several government agencies and they appear in the form of different actors, sometimes even pursuing contradictory goals. The interests and objectives of authorities do not only vary according to the roles they have as an institute, but may sometimes reflect individual or fractional interests, depending on many personal agendas.

Consequently, private actors are able to influence and manipulate government administration and policies.

In India, urban development falls under the purview of state governments, which in turn delegate related responsibilities to urban local bodies as envisaged under the constitution's 74th Amendment Act. So the state government is the highest level for politics and policy-making. For most aspects relevant to the study area, it operates through local bureaucratic channels, e.g. the Block Development Office. The government has decentralized many tasks in urban administration, creating many departments. The most important one is the Municipal Corporation and Aligarh Development Authority (ADA). Specific registration of land use and ownership is done by the *Patwari*, who keeps records at the village level. The judiciary plays an important role in land issues. Its hand is visible in land-use policy as well as in civil cases in the event of conflict and litigation. The police perform their obvious task of preventing illegal activity in general, which includes illegal land occupations, conversions, etc. Often, the police act in partisan manner to help certain group or would not act at all, they are notorious for demanding bribe for acting in either way.

Higher level interests in the preservation of farmland are mainly a responsibility of the city development authority and the state government. The official aspects of land-use policies are formulated in the Aligarh Master Plan. This even aims to protect an agricultural belt around Aligarh just outside the city limits. Much of the administration of rural land in Aligarh formally restricts the conversion of agricultural land to non-agricultural purposes, creating an enormous gap between plans and actual practice. The effectiveness of this administration is poor and allows the illegal conversion of agricultural land. Conversion is encouraged by the shortage of housing that is the result of this situation. Besides, the administrative bodies have compulsory stipulations and financial constraints that make the execution of large-scale and ambitious land-use projects a problematic affair.

Most of the time, urban planning remains in governmental records and proposals. The actual urban development is an outcome of complicated interactions among the various government agencies and local private actors, rather than from rigid planning. Many government institutions implicitly represent conflicting interests. It is not unusual for individual ADA officials, police officers, and politicians to conspire in the creation of illegal settlements, whereby all get a share of the profits.

The governmental agencies as actor in urban land market and urban planning appears to be the most corrupt. Since it consist of many institutions and different level individuals, only few corrupt officials make the entire system look corrupt. Often, some individuals act honestly and try to clean the system, but because of high stakes, corrupt system prevails over them.

The present study finds prevailing duality in the system of land supply which is characterized by many current urban concerns as well as throws light on strengths and weakness of the actors in PUI:

- there is a chronic shortage in the supply of urban land. Every individual has different interests which lead to conflicts and practices of intimidation and

manipulation to defend certain interests of specific individuals or groups. There is excessive inter-mixing of spatial functions which is the outcome of inflated land values, unrestricted, uncontrolled expansions, causing adverse environmental conditions. This problem needs to be addressed, but the costs of relocation are high and the legal proceedings are lengthy.

- the actor approach provides insight for the conduct of people and institutions involved with land transformation process in the peri-urban interface. The PUI is characterized by a great diversity of actors and a complex mix of conflicting and complementary interests.
- evidences from the study area shows that ‘beneficiaries’ and ‘victims’ can be encountered in any group, depending on the local situation. The outcome is also greatly depended on the economic and political strength, the connections, and the alliances among the actors.
- the households among the original villagers who do not possess agricultural land found to have the weakest position and are the victims of this urbanization process. They are excluded from any direct benefits of the process. Elevated land prices have further limited their ability to acquire extra residential and commercial space. These landless households only get benefit from their ancestral land that they own near the settlement. Gradually, this section of the PUI society are uprooted and pushed away from their location.
- the migrants also found to have relatively weak position, yet because of their large numbers they have reasonable presence in PUI land transformation mechanism.
- the government is both a strong and a weak actor at the same time; it depends on the individual officials and institutions. The media, court, and RTI activists also contribute to strengthen the governmental institutions. On the other hand, an alliance of residents, land owners, property dealers, politicians, and developers makes them weak with their illegal acts.
- the local landowners are strong actors in the PUI land market as they possess land, further, the alliance with developers, property dealers makes them key actor; at least in economic terms. Even smaller landowners are part of a finely branched land transformation framework getting benefits from dynamic urban land market.
- the marginalized group, in this process of land transformation is the rural landless laborers (including seasonal migrants), they have difficulty in obtaining cheap accommodation when they come to live and work in city. Whether or not they are exploited in the process of starting informal settlements is a subjective judgement. They are vulnerable, since they depend on shady financial transactions and sometimes face instances of cheating and intimidation. Nevertheless, since the formal sector fails to provide access to land for the poorest, the poor are probably glad that to find a place to live in the informal settlements. This also provides opportunity to take benefits from PUI land market. Because when the land, where they squatted is developed, they take money to vacate their occupancy.

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Chapter 9

Peri-Urbanization and Environmental Issues

Environmental issues and problems have featured prominently in processes of peri-urbanization and in the nature of PUIs almost everywhere. The Aligarh city's PUI is not an independent or isolated zone, but—as defined—dynamic interfaces between urban and rural relations. PUI development and the resultant forces and pressures acting in the PUI are therefore not only local but also regional and even national, in terms of human mobility, commodity and financial flows and their valuation, and claims on environmental resources. The stability of the PUI landscape is relatively poor as compared to urban or rural landscapes which have relatively better stability. The development of city and gradual expansions outward in the PUI, where land fee is lower and land use ways are more flexible, makes PUI environmentally vulnerable.

Some important environmental concerns are discussed below.

9.1 Land Conversion

In the North Indian Gangetic plain, one of the most intractable environmental issues is the inevitable conversion of agricultural land to urban uses, principally, housing, commercial and industrial, infrastructure and other land-extensive facilities, waste dumps, and sewage disposal, etc. The availability of larger tracts of relatively undeveloped and cheaper land in the city's PUI makes it environmentally susceptible. In other words, negative environmental externalities are imposed on the PUI.

The urban oriented land transformation results in reduced evapotranspiration, increases in runoff as natural surfaces and land cover are replaced by impervious building and road surfacing materials. Runoff creates erosion problems in the absence of adequate water drainage. Runoff also becomes contaminated by urban activities and wastes. The consequences, especially for poor PUI inhabitants of turning farmlands into bricks and concrete increase in severity as the proportion of

agricultural land decreases. Conversely, urbanization represents an unparalleled opportunity to improve living conditions, quality of life, and available resources, but the outcome is contingent on local circumstances and is likely to have differential impacts both geographically and socially.

The precise process by which land leases or sales occur reflects the local institutional structures, land tenure systems, and the relative power of key actors. Corruption and self-aggrandizement by influential actors are widespread, especially, where high profits are available almost instantly. Displaced households may receive alternative farmland (where this is still available) or monetary compensation but that may be inadequate and all too often such households become impoverished, no longer able to live without agriculture.

Arriving outsiders comprise both rural migrants seeking more affordable land and shelter than is available in town (who are typically poorer or little wealthier than most indigenes and who may find diverse livelihood opportunities in the PUI invaluable) and urban dwellers seeking larger, cheaper plots of land beyond the built-up urban area. Such people may be poor, unable to acquire any reasonable urban base, or wealthier people intending to construct large, modern (often western-style) homes on larger plots. A third category comprises urban developers and speculators buying up land for later resale or on which to construct housing or industrial premises, perhaps in association with rich urban investors. All have different effects on the PUI in terms of relative numbers and the direct and indirect impacts of their investments, livelihood activities, and resultant environmental degradation.

9.2 Loss of Agricultural Land

The study area has recorded a loss of 3,078 ha of cropland in the PUI due to urban expansions. Especially the conversion of cropland into tree plantation and vacant lands are the glaring example of it. The households in the PUI are subject to present or short-term future development pressure, begin to devote less capital for farm maintenance and management. The productivity of the land begins to decline, which ultimately results in selling these lands to property dealers. They do not maintain it as agriculturally productive land, but allow it to remain idle until such time as the advancing suburbs justify transforming it into suburban areas. The net effect of these forces causes a much greater loss of cropland to urban uses than the figures normally given for land transferred to urban uses indicate. It is estimated that for each hectare of land actually transferred into an urban related land use, almost 2 ha of additional land is lost from agricultural use.

A more significant factor intensifying the problem of loss of prime agricultural land is associated with the cost of such land conversion. These costs are twofold, and are related to the actual cost of replacing the lost farmland, as well as to government programs that prompt urban expansion and encourage loss of agricultural land. When the prime farmland is lost, the value of the crop production

is immediately foregone. The cost to replace that land is fairly substantial. The government makes efforts to bring some additional land for agricultural uses by reclaiming wastelands but the question is “how much and at what cost”.

There was an estimated 182 ha of land annually transformed in the PUI since 1980. But the conversion rate of agricultural land was much more than actually recorded. The urban area which was 2,257 ha in 1980 has increased up to 7,459 ha in 2010 recording an increase of 230 % in urban land. Further, this increasing trend is bound to continue and accelerate because the ADA plans to develop the city area to 1,147,000 ha by 2021 (Aligarh Master Plan 2011).

9.3 Land Degradation in PUI

The field survey of Aligarh’s PUI finds that urbanization process has led to widespread land degradation in the PUI. The respondents complained of deterioration in productive capacity of agricultural land. This is because urban shadow effect farmers devote less capital for farm maintenance and management in PUI. This leads to farms being kept idle and gradually converting into vacant and abandoned wasteland, to be used for future urban development. But until development, it remains degraded land (Fig. 9.1).

There were also evidences of land degradation due to urban oriented activities. This includes degraded land due to abandoned brick kilns or soil excavation sites or unrestricted, uncontrolled garbage dumping on vacant PUI lands. Similarly, the evidences of land degradation in the PUI are also because of inappropriate farming practices. These practices are the outcome of the greed for maximizing income from land in the PUI, resulting in soil erosion, salinity, alkalinity, loss of nutrients, water logging, etc.

The interpretation of satellite imagery of Aligarh city and its environs shows that 16.4 ha (There were approximately 19 soil excavation sites) of land is under the borrow pits from where currently soil is being excavated. The speculative landowners lease out their land for soil excavation (The city has a daily estimated supply of 14,000 m³ of earth) to earn revenues from idle speculative land. There was another 31.8 ha land under brick kilns (there were about 47 active and approximately 67 abandoned disused brick kilns in Aligarh PUI). The city has an estimated daily supply of 60 lakhs bricks, of which 70 % demand is met from the PUI.

Moreover, the city also generates approximately 175,000 mt of solid waste daily. This solid waste consists of an estimated 39 % organic waste, 27 % construction and industrial debris, 18 % drain silt, 13 % recyclable waste, and 5 % other wastes (mixed organic and inorganic wastes). There are about 17 official and approximately 48 other dumping sites where municipality workers and private cleaners (employed by housing society) dump these garbage. All of them are in the



Earth removal



Transported to the city



Site of abandoned brick kiln



Site of soil excavation

Fig. 9.1 Aligarh's PUI: evidence of land degradation

immediate PUI along the roads where no sanitary landfill practice is followed. The garbage is dumped on vacant lands to be dug by rag pickers and animals. This again is not only an environmental hazard but also an example of critical land degradation.

Chapter 10

Conclusion

Aligarh is a fast growing city in north India, the issues examined here are commonly found in and around most of the cities in India. This Indo Gangetic plain area has many urban settlements which are surrounded by populous rural areas characterized by productive and rich agricultural hinterland. Such conditions give rise to many conflicts between rural and urban economies, values, and people. They also generate mutually beneficial complementarities in both the rural and the urban spheres. However, the net outcome is highly selective for different groups and different locations.

The present study focuses on PUI which is a transitory zone, where combination of rural and urban activities meet. The PUI is a region of change and not a distinct boundary, where the process of change is crucial. The development in city and the expansion of city strongly influences the peripheral rural settlements in terms of natural resources and people, both physically and in a socio-economic sense.

The study finds that there was clear signs of modernization and transformation of economic activities in the Aligarh's PUI. The traditionally dominant agricultural activities are under increasing pressure and new possibilities are emerging for market-oriented agriculture. There were great differences in access to resources and opportunities leading to new patterns of livelihood. Significantly, options for non-agricultural occupations among the PUI households are enhanced because of their proximity to the expanding city.

The study for assessing the status of land resource in Aligarh's PUI finds severe *urban shadow effect* on it. There is substantial conversion of crop land to urban expansion and also for tree plantation and vacant lands in the PUI. Farmers in the PUI subject to present or short-term future development pressure, begin to devote less capital for farm maintenance and management resulting in lower productivity from the land, which ultimately results in selling these lands to property dealers. The net effect of these forces cause a much greater loss of cropland to urban uses than the figures normally given for land transferred to urban uses indicate. The study estimates that for each hectare of land actually transferred into an urban related land use, almost 2 ha of additional land is lost from agricultural use.

The sample survey further found landowners disposing their lands in response to the urban forces differently because of diverse economic and social background. Large land owners were found to be more responsive toward the urban forces. These landowners possess better education, economic status as well as better employment opportunities in urban area. Once they get employment in urban area they start selling off their land because mostly land ownership is not documented properly and possession and utilization of land is crucial for control of land. They have distanced themselves from direct agricultural activity, which poses managerial and operational problems in farming activity.

Medium land owners were found to be resisting to urban forces and still associate themselves with farming community, but they are also the progressive and dynamic section of the society, where they change occupation and this instigate them to dispose off their agricultural lands. Small landowners are also responsive to urban forces for disposing off their agricultural land. But their decision is more due to their poor and miserable economic background. These small land owners sell their agricultural land to get instant money but become landless, giving rise to unemployment problem. The urban sector is unable to cope with large population looking for jobs, especially of unskilled workers. This ultimately results in emergence of different socio-economic problem. In general, people are switching from agricultural activity due to lesser profit margins, lower status in the society, uncertainty of profit margins, operational problems, etc. This raises a very crucial issue in a predominantly agrarian economy that is endowed by fertile agricultural setting.

The study finds that there is an exorbitant demand for the urban land. Every individual has different interests which lead to conflicts and practices of intimidation and manipulation to defend certain interests of specific individuals or groups. There is excessive inter-mixing of spatial functions which is the outcome of inflated land values, unrestricted, uncontrolled expansions. The PUI is characterized by a great diversity of actors and a complex mix of conflicting and complementary interests. Evidences from the study area shows that 'beneficiaries' and 'victims' can be encountered in any group, depending on the local situation. The outcome is also greatly depended on the economic and political strength, the connections, and the alliances among the actors. The households among the original villagers who do not possess agricultural land found to have the weakest position and are the victims of this urbanization process. They are excluded from any direct benefits of the process. Elevated land prices have further limited their ability to acquire extra residential and commercial space. These landless households only get benefit from their ancestral land that they own near the settlement. Gradually, this section of the PUI society is uprooted and pushed away from their location.

The most intractable environmental issues is the inevitable conversion of agricultural land to urban uses, principally housing, commercial and industrial, infrastructure and other land-extensive facilities, waste dumps, and sewage disposal, etc. The availability of larger tracts of relatively undeveloped and cheaper land in the city's PUI makes it environmentally susceptible. In other words, negative environmental externalities are imposed on the PUI in the form of

agricultural land transformation, the loss of agricultural land and widespread land degradation. The respondents complained of deterioration in productive capacity of agricultural land and land degradation due to urban-oriented activities as well as because of inappropriate farming practices.

Annexure 1

QUESTIONNAIRE

VILLAGE PROFILE

1. Name of the village :
2. Block name :
3. Distance from Aligarh city :
4. Connectivity to the Aligarh city:
5. Common mode of transportation:
6. Type of roads:
7. Total population of the village:
8. Total no. of household in the village-
9. Religion-wise

Hindu	Muslim	Others
-------	--------	--------
10. Type of houses in the village (in %age)

Pucca	Kuchcha	Mixed
-------	---------	-------
11. Infrastructural Facilities / Service in the village

Post office	Telephone booth	Bank	School
Hospital/Health centers		Any other	
12. Status and duration of electricity supply to the village (Hours / Day)

Agricultural purpose	Domestic purpose	Industrial purpose
----------------------	------------------	--------------------
13. Access and source of water

Domestic	Agriculture	Industry
----------	-------------	----------
14. Major economic activity
15. Organized industries in the village
16. Ownership of the industry

Local	Outsiders	Co-operative
-------	-----------	--------------
17. Any degraded land

Brick kilns	Earth evacuation site	Any other	
Active	Disused	Active	Disused
18. Does the village have common lands?
If yes then what type of land and for which purpose it is used?
19. Any signs of distinct urban imprints

Positive imprints	Negative imprints
-------------------	-------------------
20. Other observations (if any)

RESPONDENT PROFILE

1. Name.

2. Sex

3. Age

4. Marital status

5. Religion

6. Caste

7. Educational status

8. Type of house

9. Housing condition

No. of rooms (per person availability)

Status of sanitation

Status of ventilation

10. Any other activity carried out from the house and area devoted to it?

11. Type of economic activity associated with:

Primary

Secondary

Tertiary

Any other

12. Type and place of work

13. If not employed in the village – distance , frequency and mode of travel:

14. If Self Employed, type and place of work

SOCIAL – ECONOMIC PROFILE

1. **Family size**
2. **Total family member**
3. **Total no. of children**
4. **Educational status of the family**

Male	Female	Age
------	--------	-----
5. **Economically active members in the household**

Male	Female	Age
------	--------	-----
6. **Status of women in the household**

Housewife	Working	Any other
-----------	---------	-----------
7. **Place and type of work**
8. **Sector wise employment in the household**

Primary sector	Secondary sector	Tertiary sector	Age
----------------	------------------	-----------------	-----
9. **Production of primary commodities**

Crops	Livestock – milk / Meat	Others
-------	-------------------------	--------
10. **Type of Agriculture**

Subsistence	Commercial	Mixed
-------------	------------	-------
11. **Size of Land holding**
12. **Income generation from different sectors**

Primary sector	Secondary sector	Tertiary sector
----------------	------------------	-----------------
13. **Total investments**

Primary sector	Secondary sector	Tertiary sector
----------------	------------------	-----------------
14. **Have you availed any subsidy for your activities**
15. **Total family income (Rs/month)**
16. **Total expenditure (Rs/month)**

Food	Education	Health	Clothing	Family expenses
Leisure	Other			
17. **Have you made any investments?**

Purchase of Land	House Construction	Marriage	Any other
------------------	--------------------	----------	-----------

18. **Have you borrowed money?**

19. **Source and reasons of borrowing**

20. **Any change in economic activity?**

21. **If yes, reasons**

22. **Any modification in your economic activity:**

Share cropping

Leasing land

Training in skills or profession

Business / Trading

Taking help from institutions/persons

Other

23. **Have you disposed off your land?**

24. **Reasons for disposal**

25. **Land value**

At disposal time

Current

26. **Who was the buyer of your land**

27. **Size of land holding sold**

28. **Percent of total land you own**

29. **Was there any pressure to sell your land**

30. **How you resisted / succumbed to pressure**

31. **Do you regret your decision?**

ENVIRONMENTAL PROFILE

1. **Brick kilns in the village**
If yes: No. of Brick kilns
2. **Status of Brick kilns**
Dormant Working
3. **Abundance period of Brick kilns**
4. **Current uses of land for the abundant Brick kilns**
Vacant Reclaimed Residential Any Other
5. **Do you sell earth?**
6. **Status of earth evacuated land**
7. **City garbage or solid waste dumping in your village?**
8. **Dumping sites**
Road side Vacant land Directly into the Nallah Any other place.
9. **Nature of waste**
Organic Non organic Mixed Other
10. **Is city waste water coming upto the village?**
11. **Is it used for any purpose?**
Irrigation Washing clothes Bathing Any other
12. **does it has any impact on local environment**
Crops affected Foul smell Health problem Any other problem
13. **Vehicular traffic on roads passing through the village**
High Medium Low
14. **How you rate the presence of industry in the village:**
15. **Do you feel any change in social life:**
Within family Within neighborhood Within village Everywhere
16. **How you rate proximity to city**
Very advantageous Advantageous Disadvantageous Burden
17. **Reasons**
18. **What in your view is the major problem faced by you**
Unemployment Destruction to natural resource Vulnerability to natural stress
Landlessness Shortage of capital Social hindrance in progress
Lack of family support Lack of skills Any other
19. **Any other information**

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