



The Impact of Urbanization on Land Use Dynamics in Peshawar City District, Pakistan: A Geoinformatic Approach

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Abstract: Peshawar City, the sixth largest city of Pakistan is also the capital and largest metropolis of Khyber Pakhtunkhwa province. It has seen extremely fast growth during the last twenty-five years whereby its built up area more than doubled between 1991 and 2012. These unprecedented changes in the built up area and population of the city district not only resulted in an unprecedented urban sprawl with a mixture of an increasingly dispersed pattern of residential and other urban land uses but also witnessed land use dynamics with far reaching implications. This paper analyses the spatial and temporal aspects of land use dynamics in Peshawar city district during 1991-2012 period. The paper discusses the present land use and the land use change between 1991 and 2012 along with the factors that are responsible for the land use change and their policy implications. Main objective of the study was to find out impact of urbanization on land use dynamics of the city. Both primary and secondary data were used for the study beside satellite images. The secondary data were generated from revenue record, real estate agents and developers. For calculation of land use dynamics in 1991 Landsat images were used while for the year 2012 SPOT 2.5m images were acquired from SUPARCO. ArcMap was main software used for analysis and presentation of results in spatial format. Results of the study reveal that there has been a tremendous growth of built up area around the core of the city that has drastically changed the land use dynamics of the city. Due to lack of any workable plan most of these expansions are in the form of unplanned sprawl in the form of ribbon development along the roads as well as leap frog growth mostly on prime farmland.

Keywords: Metropolis, Dispersed Pattern, Sprawl, Land use Dynamics.

1. INTRODUCTION

Land is the most important resource on which most of the human activities depend [1]. Land use is human utilization of property that changes with its functions such as food production, shelter provision, leisure or the production of raw material for industries [2-3]. Literature about land use dynamics in Pakistani cities is very scant. However, some researchers in the developed world have explored models and theories regarding structure and land use in the cities (see for example [4-8] while others have used descriptive approaches to analyze land use in cities [9]. A variety of physical and human factors affect land use dynamics in the cities thereby affecting whether a piece of land is used for industrial, agricultural, commercial, residential or any other purpose [10-11]. The suitability, capability and value of the land determine its usefulness for a

particular purpose [12]. In town planning, different models are used to know the mechanism that defines size, nature as well as type of land use in urban regions [13]. Increasing Population coupled with enhanced economic condition are considered as vital reasons that affect changes in land use subsequently affecting the amount and distribution of land available for farming [14]. The loss of agricultural land has been reported as one of the most important implications of urban expansion in many countries of the world [15-16]. With development of urban areas, changes in land use are widespread that can occur inside and outside the urban limits [17]. Mainly, built-up areas are liable to changes in land use owing to convenience, rent/dealing dynamics and government strategy [18-19]. The growth of built-up land areas around a metropolitan region is taken as an indication of regional economic dynamism [20-21]. However, it

also results in environmental degradation, reduction of agricultural land, community crumbling and extra infrastructure expenditure [22-24]. Modern state of the art technology, Geo-informatics has effectively been used to carve the existing and probable future patterns of land use in cities [25-28].

In metropolitan areas the association of land uses is an indication of diverse requirements of the various financial actions [29]. Consequently, the patterns of land use in urban areas characterize the collective effects of innumerable decisions and procedures by individuals and institutions. Changes in land uses have a number of ecological impacts affecting both urban and rural areas. Most prominent land use dynamics are the land conversion that happens in the urban fringe of big cities under various economic and demographic factors [23].

This study examines the historical and spatial aspects of dynamics in land use for Peshawar city located in the Khyber Pakhtunkhwa (KP) Province of Pakistan. This city has experienced significant growth of built up environment from 1991 to 2012, leading to urban sprawl which, in turn has resulted in a diversified pattern of residential development in the peri-urban areas. This paper first discusses the present land use and then analyzes the land use changes between 1991 and 2012. Factors behind land use changes and their policy repercussions have also been discussed. Lastly, results of the study have been summarized in the closing section.

2. MATERIALS AND METHODS

For the present research, both primary and secondary data was considered. Data pertaining to secondary sources were collected from various agencies including different government organizations like Peshawar Development Authority (PDA), district revenue office, Soil survey of Pakistan and Pakistan Bureau of Statistics. Revenue department was the main source of data for land use and land values. For the current research, 1991 was taken as the base year as detailed land use data including revenue and satellite images were not available before that period. Besides, field surveys were also conducted for collection of primary data such as information about market land values in all parts of the city district.

The satellite images SPOT 2.5-meter resolution and LANDSAT 30 meter for the year 1991 and 2012 were used for spatial and temporal analysis of land use patterns in the study area. The SPOT-5 2.5m imagery was obtained from Pakistan Space and Upper Atmospheric Research Commission (SUPARCO) regional office, Peshawar, while LANDSAT 30m images were downloaded from USGS website, Earth Explorer. Topographic maps were collected from the Survey of Pakistan (SOP), Rawalpindi. Data pertaining to different land uses and land values were obtained from the Land Revenue Department, Peshawar. The City District map and settlement maps were collected from the City District government, Peshawar. Population data up to the year 1998 were obtained from Population Census Organization, Islamabad. As there has been no census in Pakistan since 1998, therefore, population projection was used for the year 2012. Similarly, data about land values were collected from the District revenue office for determination of government rates about land. There are around 200 major settlements distributed in the city of Peshawar and the market value and trends in these settlements were assessed.

ERDAS Imagine software was used for the image analysis to classify Land use categories. Ground truth verification was carried out in the field using GPS to rectify errors in the image classification. However, most analysis was conducted with the help of Arc Map. Land use was classified into different categories including agricultural, residential, commercial, and industrial and rangeland for both the years 1991 and 2012. These categories were used because they were the dominant land use categories in the study area. Changes in land use for these years were calculated by overlay analysis of the classified images of 1991 and 2012. For the appraisal of land use trends from the city center, buffers were drawn radiating from the city center at 5 Km interval. The 5 kilometer interval was considered as sufficient radius where different land uses could be easily analyzed. Separate layers were created for both government and market trend in land values using rigging tool in Arc GIS. The outcome of the result was presented in the form of thematic maps, tables and diagrams to fulfill the objectives of this study.

3. ANALYSIS AND DISCUSSION

Various land use categories were identified in Peshawar city district. Taken as a whole, land use in the city is divided into different groups. Their spatial distribution and dynamics are discussed in this paper.

3.1 Spatial Distribution of Land Use

Several human and physical environmental processes influence the spatial distribution of land use in urban regions. Humans also modify their environment and the landscape through fragmentation by conversion of big lots into smaller fragment of land by changes in land use, predominantly, in the urban periphery. For the purpose of orderly arrangement of land uses and encourage efficient growth of the city, spatial planning policies under the Local Government Act 2000 [29] were designed for the 'physical integration' of city area as well as its periphery into a whole entity and designated it as city district in 2001. Nevertheless, there have been no practical land use plans implemented to materialize this physical consolidation. Spatial distribution of the land types in Peshawar are presented in the figure 1 while their area is shown in Table 1.

As the Table 1 shows, three-fourth of the total area within the city boundary of Peshawar is either

farm or range land. Residential land use dominates in the category of built up area, while industrial use including brick kilns is another dominant land use in nonfarm uses. Here, area covered by brick kilns has been assigned a separate category in the Table 1 because this is one of the major threats to agricultural land in Peshawar. Brick kiln industry usually consumes larger area than other industrial units. Next major category is the commercial area. The spatial distribution also shows a major built up area in the center of Peshawar. The northern outer fringe is dominated by irrigated farming while in the south and west farming is mainly rain fed. Almost all of the rangelands are found in the southern part of Peshawar district. There is a significant form of unplanned urban growth emerging from the spots of built-up areas and brick kilns distributed all over the agricultural land.

3.2 Land use Gradient

Spatial arrangement of a city, regardless of the processes and factors involved in its formation, has a strong impact on the ecological, physical as well as socioeconomic developments within its borders and outside. In order to understand the correlation of spatial pattern of sprawl and the processes that affect them, it is necessary to analyze the structural characteristics of a city. In this paper, therefore, an integrated gradient analysis was conducted to quantify the pattern of urbanization in the study

Table 1. Peshawar City District: Land Use, 2012

Type of Land use	Area (Hectares)	Percentage
Residential	18,920	14.9
Industrial	426	0.3
Brick Kilns	2,360	1.9
Commercial	970	0.8
Transport	465	0.4
Open Space	784	0.6
Graveyards	1,070	0.8
Farming	69,783	55.1
Rangeland	23,208	18.3
Barren land	3,664	2.9
Water Bodies	5,060	4
Total	126,710	100

area as well as relate it to environmental and socio-economic developments. For this purpose, Buffer zones were created having a radius of five kilometers each, were drawn from the city center which is located at the historic Qissa Khwani bazaar (CBD of Peshawar city) to identify fluctuations in the land use moving from the city center to the peripheral areas.

In each of the identified five zones, the percentages of various land uses (Fig. 1) were calculated (Table 2). This table shows that greatest amount of the built up land of Peshawar is located in the central zone designated as A. Moving outwards, its percentage decreased and that of the farm and rangeland increased moving away from the city center to the fringes. Hence, the built up area constitutes more than 60 % of the total land in the innermost zone A where only 30 percent is farmland. Conversely, in the outer zone, more than 85 percent area is agricultural or rangeland whereas only about 3 percent of the total land in that zone is built up. Comparing the land use patterns of 1991 and 2012 showed that there is a rapid intrusion of agricultural land by the built environment in the inner zones. For instance, in 1991, the farmland

covered 47 % of zone A, however, in 2012, it was diminished to 30 %. In contrast, the built environment of zone A has increased from 44 to 61 percent. The situation in the next zone i-e B is also the same where the agricultural land has decreased from 67 percent in 1991 to 60 % in 2012, whereas the built up area increased from 15 to 30 percent. In the next outer zones i-e C, D and E, although the built environment is engulfing the farmland, some land is also converted from nonfarm uses to agricultural use (Table 2).

A deeper look into the gradient of land use in Peshawar for built environment and dividing it into various subcategories like commercial, residential, transport and industrial as well as leisure uses consisting of playgrounds and parks is shown in Fig. 2. It shows that commercial accomplishments in the city are distributed over a large area. Maximum commercial activities are concentrated in the central parts of the city where commercial hub is located older parts of the city and another adjacent commercial hub is now located in the British developed modern area i-e cantonment. Such cantonments are usually found in almost all the former British colonies around the world. Majority

Table 2. Peshawar City District: Land Use Gradient

Land use	Zones of 5- Kilometer Width from the Centre to Periphery																			
	A				B				C				D				E			
	1991	2012	1991	2012	1991	2012	1991	2012	1991	2012	1991	2012	1991	2012	1991	2012	1991	2012		
	A*	%	A*	%	A*	%	A*	%	A*	%	A*	%	A*	%	A*	%	A*	%	A*	%
Residential	33	44	46	61	36	15	69	30	36	10	58	17	8	2	18	5	4	2	6	3
Industrial	<1	<1	<1	<1	1	<1	1	<1	2	1	2	1	1	<1	1	<1	<1	<1	<1	<1
Brick Kilns	0	0	0	0	2	1	5	2	4	1	12	3	3	1	6	2	<1	<1	<1	<1
Commercial		0	0	0	2	1	5	2	4	1	12	3	3	1	6	2	<1	<1	<1	<1
Transport	3	4	3	4	2	1	3	2	1	<1	2	1	1	<1	1	<1	<1	<1	<1	<1
Open Spaces	1	1	1	1	1	<1	1	<1	1	<1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Graveyards		1	1	1	1	<1	1	<1	1	<1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Farming	2	3	2	3	2	1	3	1	2	1	2	1	<1	<1	<1	<1	<1	<1	<1	<1
Rangeland	1	1	1	1	1	<1	2	<1	4	1	4	1	3	1	3	1	1	1	1	1
Barren land	35	47	22	30	155	67	141	60	194	56	225	65	165	47	198	56	65	32	85	42
Water Bodies	0	0	0	0	10	4	1	<1	63	19	31	9	123	35	111	32	101	50	97	48
Total	75	100	75	100	235	100	235	100	345	100	345	100	350	100	350	100	201	100	201	100

of the industries and Brick kilns are concentrated in the 3rd and 4th rings i-e (C & D). More specifically, the brick kilns are found in the outer zones i-e B, C and D as can be seen in figure1). Interestingly, area under leisure land uses like playgrounds and parks diminish as we move away from center of the city. Data shows that residential land use gradually decline away from the city center which is shown by solid lines in Fig. 2.

Area covered by farms and rangeland as discussed before, steadily increase as we move away from the city center shown by solid lines in Fig. 3. Reaching to a distance of 25 kilometers from the city center, the zones are predominantly covered by agricultural or rangelands. Similarly, area under range and barren land also increases outwards from the city center. This pattern of land use partially follows the classical model of Von Thunen (1826) [30]. Rangeland and barren land is largely concentrated in the western and southern parts of the city. These lands can be converted into farmland, however due to lack of irrigation system in these areas it is difficult to convert. In some areas particularly in the south, the topography also makes it difficult. All the major sources of water for irrigation are located in north of the city while the

gradient of land is from south to north.

3.3 Land use Change Analysis

This segment includes an analysis of the spatial and temporal changes in land use and reasons behind these land use dynamics in the city district of Peshawar. Table 3 indicates quantitative dynamics of land use between 1991-2012 period. There has been a drastic change in residential use that covered 6,138 ha in 1991 and reached to 18,920 ha in 2012, which equals to an increase of more than three times. Residential land use made up more than 90 % of the built environment in 2012. There is a dense part of residential area inside the old walled city where land values are also very high. Multistory residential buildings mostly double and triple story buildings were also found in the study area. In the inner residential area, the streets and roads are very narrow which often cause traffic jams, particularly, during the peak hours.

There has also been a significant increase in the category of industrial land use and the main reason for this increase is the rise in the number of brick kilns which have been presented as a separate category in Table 3. As this table shows,

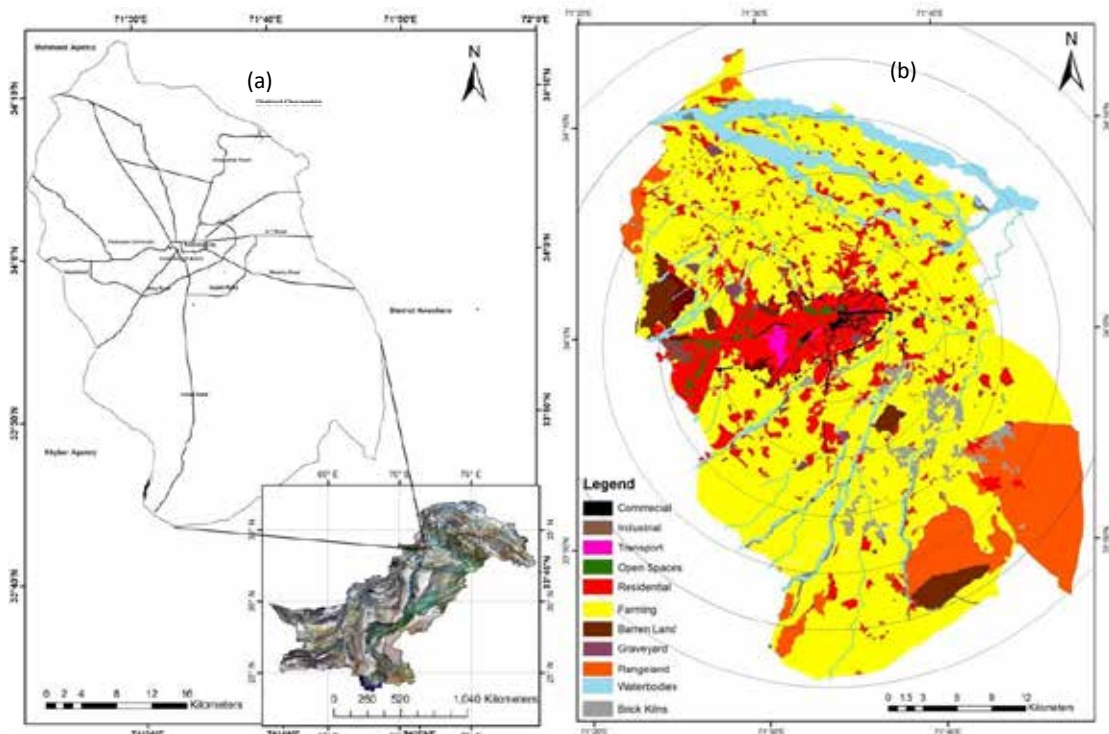


Fig. 1. Peshawar City District: (a) Location (b) Spatial Distribution of Land Use, 2012. (The circles have been drawn at 5 kilometers interval from the city center)

area covered by brick kilns has increased by more than 100 percent. Unfortunately, the brick kilns are mainly found on the most fertile land which is posing a serious danger to farmland in Peshawar. Due to enhanced economic development coupled with rising population, the rate of building of houses, commercial and other buildings has escalated which, in turn, has increased the demand for baked bricks. In this manner, new brick kilns are being constructed in previously cultivated or cultivable areas.

There has also been a noticeable increase in the commercial activities both in retail trade as well as offices like banks and insurance corporations. Peshawar city district has experienced a 35 percent increase in the commercial area between 1991 and 2012.

Interestingly, there has also been an increase of about 25 percent in the area covered by farmland due to the change of a sizeable chunk of barren and rangelands into farmland. Prior to 1991 major part of the southern and western parts in Peshawar was inhabitable and barren. However, with the construction of gravity canals taken from Kabul River helped cultivate most of this barren land. But that part of barren land which is situated in the west was allocated for the development of two large townships i-e Hayatabad town which is now operational and Regi Model which is still in construction phase. These townships now occupy major part of the former barren land and now barren land in this side constitutes only 3 percent of the total area in comparison to 16 percent in 1991. In spite of a significant decline between 1991-2012, period, still rangeland is the second most dominant category of land in Peshawar, though a very large

amount of this category was converted to cultivated land. Besides, nearly 4 percent of the area in Peshawar consists of water bodies, both perennial and non-perennial rivers. Usually, the non-perennial rivers cause flash flood every year during summer season with a huge water discharge.

3.4 Factors Affecting Land Use Change

A number of factors were identified to effect land use dynamics in Peshawar city district which include government factors such as strategy and policy, market and economic environments, demographic dynamics, societal values and approaches.

3.4.1 Government Policy and Strategy

Government decisions, including their policies and strategies, are considered crucial factor in land use changes. Land use distribution in urban regions is usually controlled by development control through exercising subdivision and zoning and by devising regulations for building controls. Unfortunately, there is a lack of valid zoning plan for the City due to the lack of a development or structure plan. Although, a master plan was devised in 1965, it could not be approved or implemented. Similarly, in 1986 a detailed structure plan was prepared but the result was same, the plan was not implemented as it was not approved by government. Unlike the other big cities of Pakistan such as Islamabad and Rawalpindi, Peshawar city district still does not have subdivision regulations for private sector which is currently the main organ of development [29]. In absence of such regulations, the private entrepreneurs are not regulated to follow the prescribed land subdivision regulations. According to these regulations, the private entrepreneurs

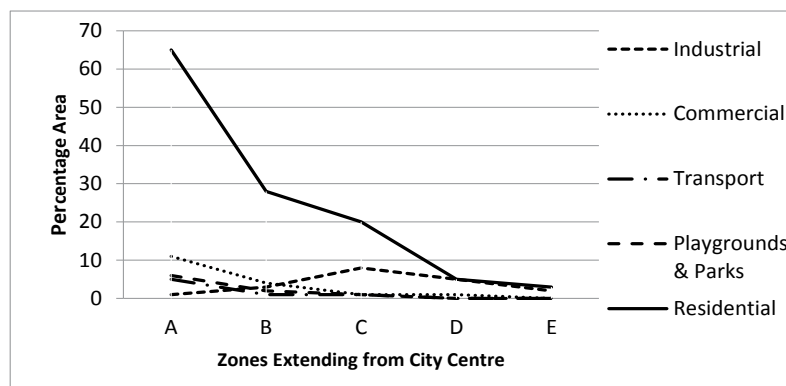


Fig 2. Land use Gradient

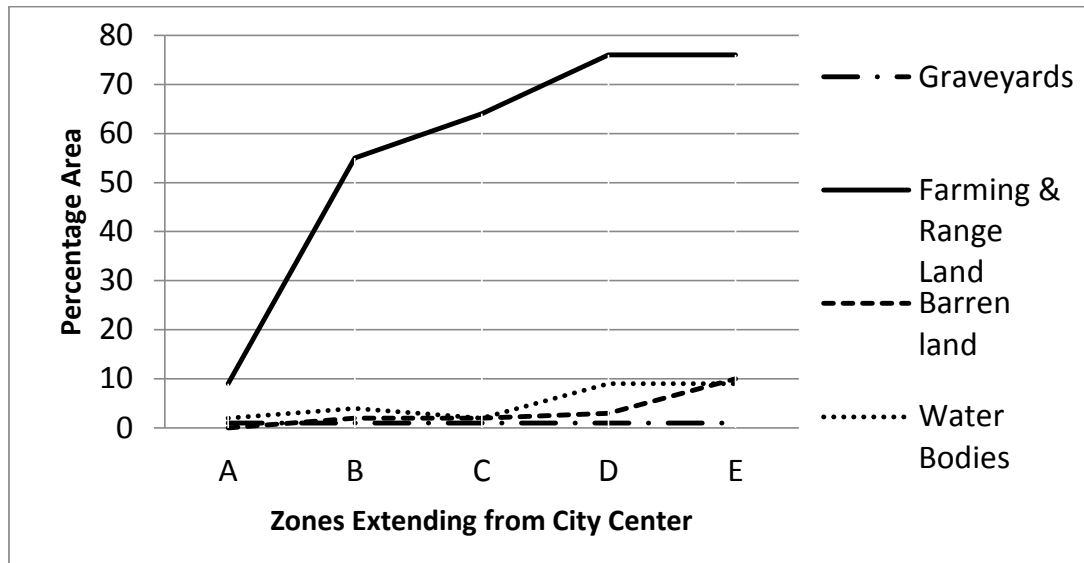


Fig. 3. Land use gradient (Source: SPOT Image, 2012)

have to allocate the existing land on certain ratios for various types of land uses such as residential, commercial, Industrial, green space, roads and streets. Currently there is only a single measure to control development in the city is building byelaws in which a person prior to house construction seeks the approval of the plans of residential or other building from the local authorities. This type of development control is also followed only within certain old municipal limits and Hayatabad Township. Thus, the surrounding fringe areas have no implementation of such development controls. To manage land use and to direct urban development, Peshawar Development Authority (PDA) was formed under NWFP Urban Planning Ordinance 1978 [34] (GoNWFP, 1978). Under this Regulation, the PDA was given the task to set up development plans and embark on key developments inside the corporation limits aimed at preservation and protecting open spaces and archaeological or historical sites; slum clearance, improvement of insanitary or dilapidated areas and the replacement and resettlement of their inhabitants; as well as the location and development of new or expanded urban areas. All these activities were in infringement of the Local Government Act (1979) [35] that Municipalities were given the same mandates by section 76 (a, b and c). As a consequence, clashes started amongst these organizations [5, 36].

PDA formulated a Structure Plan (1986-2001) for the future development of the city [37]. It was

a very detailed document containing very good proposals for the future development of the city but unfortunately, PDA could not get the plan approved from authorities and therefore not implemented. As a third effort of Urban Planning and Development Management System for Peshawar, the Structure Plan was updated for the period 2001-2020. However, so far no effort has been made for its approval and it appears to meet with the same fate of failure. This is due to the lack of legal and institutional structure and insufficient professional potency of PDA that spoiled government attempts to stop haphazard urban growth [38].

Even there has not been an efficient land use planning on part of the government. Governmental housing schemes are also in many cases not following proposed legislation about land use and density standards that has led to a price hike and shortage of land available for housing. Due to this sharp rise in property values, the investors prefer investment in such informal housing schemes as they consider it more lucrative [39]. As pointed out by Task Force on Urban Development of the Planning Commission of Pakistan, "In large towns, land is a hotly contested commodity and is planned and disposed-off through powerful, and often compromising, planning agencies and through political and economic pressure of powerful interest groups" [39 p-12]. These powerful investors firstly initiate land development for sale which is then leased to the elite and middle income

Table 3. Major land uses in Peshawar City District, 1991 & 2012

Land use	1991		2012		Change 1991-2012	
	Area (ha)	Percent Share	Area (ha)	Percent Share	Area (ha)	Increase (%)
Residential	6,138	4.8	18,920	14.9	12,782	67.5
Industrial	366	0.3	426	0.3	60	14
Brick Kilns	970	0.8	2,360	1.9	1,390	58.9
Commercial	628	0.5	970	0.8	342	35.2
Transport	465	0.4	470	0.4	Negligible	1
Green Space	680	0.5	784	0.6	104	13.3
Graveyards	1,070	0.8	1,070	0.8	-	-
Farming	51,957	41	69,783	55.1	17,826	25.5
Rangeland	39,654	31.3	23,208	18.3	-16,446	-41.7
Barren Land	19,722	15.6	3,664	2.9	-16,058	-81.4
Water Bodies	5,060	4	5,055	4	Negligible	-
Total	126,710	100	126,710	100		

Source: LANDSAT, 1991, SPOT image 2012 & GoKP Land Revenue Record, 1991-2012

groups without considering the demands and needs of the common people. This has resulted in the development of numerous elite middle-income low-density colonies leading to an uncontrolled sprawl. At the same time, environmentally hazardous wildernesses are left for the low-income groups where informal smaller residential lots are produced [39]. Therefore, in Regi Model Town and Hayatabad, with the initiative of the local planning authorities, developed low-density which were meant for low income, now mainly cater for middle and high income groups. In addition to this, private developments have also initiated low-density housing schemes like University Town and WAPDA colony. Low income groups, pushed out of the formal housing market are forced to occupy illegally the low lying and hazardous location like Shah Dhand and Gharibabad that have over time developed into slums.

3.4.2 Market and Economic Forces

Location of land is one of the most important factor that affect distribution of land use. It is location that mainly determines the values of land. The significance of location in determination of land

value has been highlighted by many researchers (see for example [40-42] which, ultimately, led to land use dynamics. High prices of land can be afforded by certain activities which have high profit over a unit of land, for instance commercial and shopping, business. However, land uses that require big chunk of land like airports and industries prefer to be sited at inexpensive locations. Price of land have spatial variation in an urban area. It has been found that generally, the city center typically has the maximum land value that decreases as one moves outward. In case of Peshawar city district as well, the prices of land were found to be the highest in the commercial hub of the city i-e CBD and there is a decreasing trend in the land values outwards. However, there are exceptions, because due to better accessibility, the land values are also very high along major roads emitting out of the center, particularly, in these locations which are now commercial centers (Fig. 5).

a. Land Values

Beside other factors, land use in a city is affected by price of available land [12]. Supply and demand factors results in dynamics of land value that vary

both spatially and temporally, depending upon market mechanism. It is a known fact that supply of land remains constant within a city, therefore land values basically depend upon demand for the available land [43]. Depending upon location of the plots whether they are located at the central locations are along major transport corridors usually fetch very high prices due high level of accessibility [44-45]. Such activities like commercial and business can afford high land values because of their high profitability per unit area [46-47]. Conversely, some activities like industries need large space for their operations cannot afford such high land values and are located at a relatively low price of land. The land to be used by a particular activity mainly depends on competition between various uses. The price rent has to be paid by a particular user to prevent the site going to some other use that can secure a particular given site by outbidding all other uses. Hence commercial land uses usually have the highest advantage for more accessible locations that is why the CBD or core of the city mostly has retail outlets in Peshawar city. With increasing distance from the CBD, other uses like residential and manufacturing dominate. However, there are variations in this general pattern due to the development of outlying shopping centers and high-class residential areas at the fringe of the built up area.

In Peshawar, there are two kinds of land values prevailing; one type of land value is usually calculated by revenue department according to which land tax is collected while the other type is determined by market factors in open market. Revenue department determines the land rates according to location of land as well as the size of plots. For land parcel which is below four kanals (505.857 m² or eighth part of an acre) and the plot is situated on transport corridor, is considered as commercial property and rates are determined. Conversely, if size of the parcel is above 4 kanals but below 16 kanals, would be taken as residential and taxed at lower rates than commercial. Similarly, land parcel which is over 16 kanals is considered as agricultural land irrespective of its location. Government land values are only used for the purpose of tax collection and transfer of property. Consequently, market rate of land values was needed for this study which was collected from diverse group of people related to land like of comprising Patwaris, property dealers

and other people related with real estate business. Overall market values data was collected from 200 communities covering the whole district as shown in figure 4. Arc Map software was used for interpolation of the sample data to obtain land values for the whole city district as indicated in Fig. 5.

The current study used Alonso (1968) model of land values where he proposed that land rent show a declining trend from city center to the periphery. This decline is very sharp for commercial land use and gradually the slope down to residential and farming land [48]. The same trend is observed in Peshawar. As one moves from city center to the fringe, the price of land decreases though the decreasing trend is not constant everywhere (Fig. 5). Reduction in land values is the sharpest on southern side while the decline is relatively less sharp on the northern side because of level topography the land can be easily converted to build environment; therefore, land speculation for residential use has been initiated.

There has been a sharp rise in land values in Peshawar during the past 12 years (Fig. 5). For instance, the highest price of land at the central part has increased from half million per Marla (Marla is unit of land measurement locally which is equal to 25.2929 m² or precisely it is 160th part of acre) in the year 2000 to more than a million in 2012. Spatial distribution of land values has been shown in figure 5a, which indicates very high price of land at the central part and decreasing towards periphery. There is another core of highest values in the west containing University town and Khyber Road commercial area. Initially, a planned community i-e University Town located in the west, is secondary nucleus for high-class. However, notwithstanding the commercial pressure, was converted to commercial uses at a very rapid pace. The commercial growth continued rapidly and by the year 2012, the primary and secondary nuclei were merged together. Hayatabad Township comprises another high land value area. As the residential land uses have lower bidding for available land, than commercial uses; consequently, price of land in Hayatabad is lower than the city center and University town. The land value curve in the Fig.6 confirms these findings which show a sharp fall in land values moving away from the core

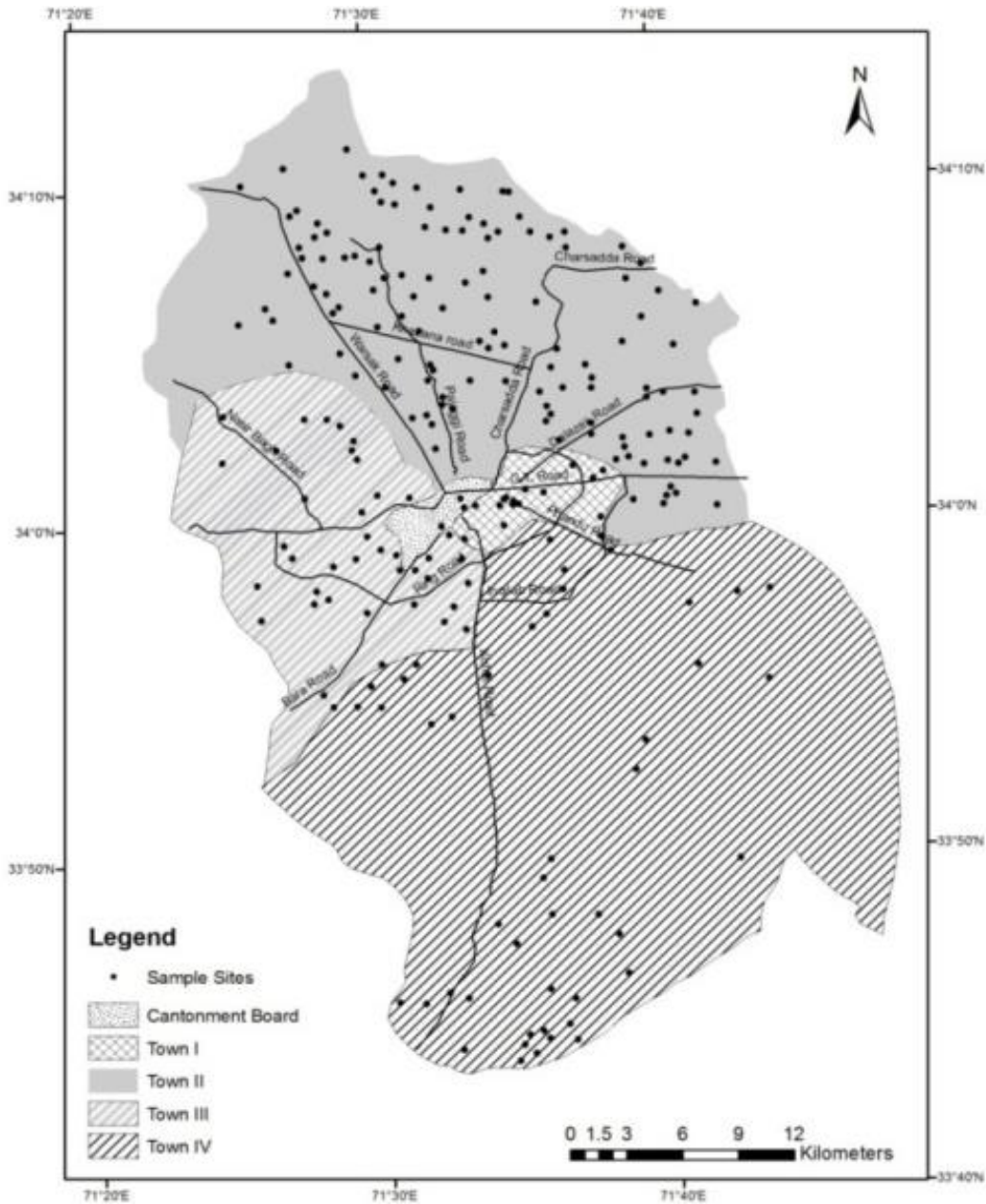


Fig 4. Sample Sites for Land Value Data

as well as a change in the land use from commercial to residential. The land values gradually fall further moving outwards from the city core with the replacement of the built environment by agriculture and range land (Fig. 6).

b. Additional market factors

Land use dynamics are also influenced by some other market factors that include infrastructure availability, demand and supply, size of plot as well as condition and age of buildings. These market

forces are clearly visible in Peshawar because several old buildings were converted to commercial centers in and around CBD and alongside major roads because of increasing demand for commercial buildings and high rents and prices of commercial land. An excellent example of the effect of these market forces is the conversion of the site of Deans Hotel into a major shopping center having hundreds of shops, marriage halls and a hotel. The Deans shopping mall is situated in the secondary CBD of Peshawar city located in the Cantonment board area in the western side of Qissa Khwani bazaar,

the old CBD. Another example is the development of multistory office blocks exactly opposite to the Deans shopping mall.

3.4.3 Social, Technological and Demographic Factors

Changes in social status coupled with increasing population as well as attitudes are some of the other important aspects that influence the demand for a specific land use. In Peshawar, for instance, with growing population the need for housing also increased in the city. At the start, the inhabitants of Peshawar were not in favor of moving away from the main city and majority favored to settle down in adjoining communities like Gulberg and Nishtarabad contiguous to old city or Defense near the Cantonment. Due to this reason, the residents did not opt for living in the remote township schemes in their initial stages. For instance, when the first phase of Hayatabad Township which is situated at the outskirts of the city, was announced for plot booking in 1980s, the applicants for the offered plots were the same as the number of plots, some of which were of two kanals in size (1200 Sq. Yard). However, gradually, the priorities of the citizens of Peshawar have changed and with the passage of time, Hayatabad Township has become

a highly contested and demanded residential area. There is a tough competition now to seek plots in Hayatabad due to its better facilities and beautiful layout which has made it an elite residential area of Peshawar. A number of other new residential estates are also emerging in the fringes of Peshawar where agricultural land is being converted into housing colonies. An important factor identified in this study which is encouraging the people of Peshawar to shift to the townships located in the outskirts of the city is improvement in their social status. Due to increasing business activities, the people can now afford to purchase expensive property and pay for the transportation cost involved in commuting to the city core for their jobs, businesses and other daily activities. After initiation of loans from bank for buying cars and motorcycles on low interest rates and easy installments has dramatically increased car ownership for transport that has improved mobility and it also stimulated the growth of housing schemes in the city fringes.

3.4.4 Land Use Planning and Policies

In Peshawar City District, a variety of public organizations and political factors have an impact on land use. However, due to the lack of coordination between these agencies and political factors, there is

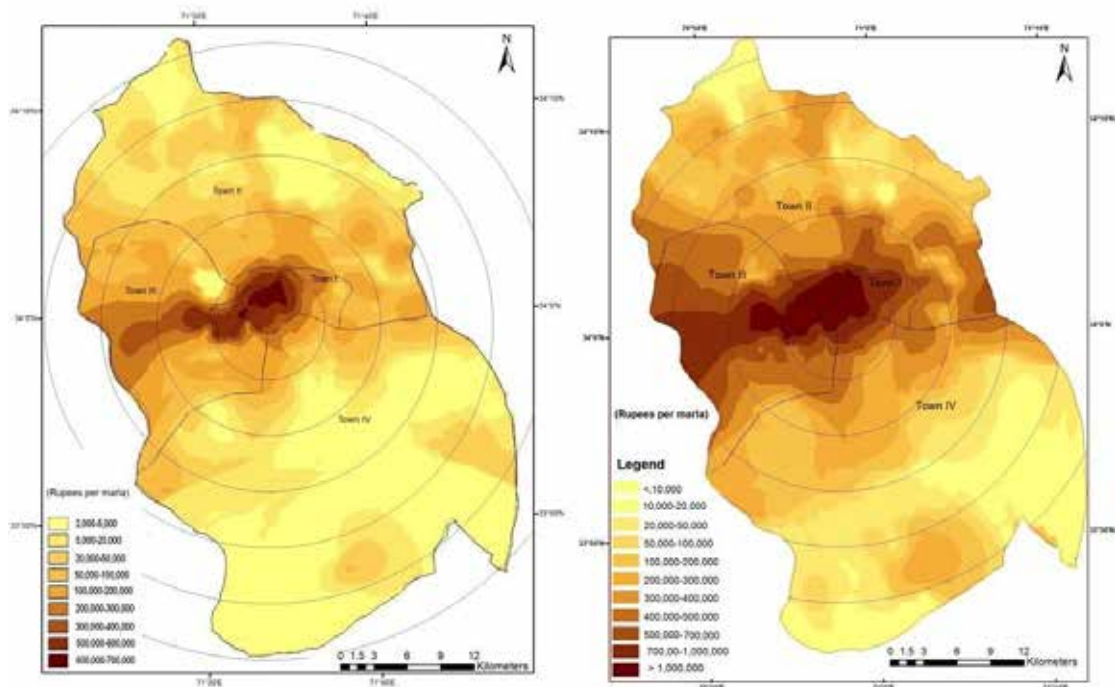


Fig. 5. Peshawar City District: Land Values in open Market (a) 2000 (b) 2012

no integrative planning for land use in urban areas. Nevertheless, certain agencies like Cantonment Board, Defense Housing Authority (DHA), City District Governments (CDG) and Peshawar Development Authority (PDA) individually endorse programme and schemes in their own dominions. NWFP Urban Planning Ordinance 1978 was promulgated in 1979 that replaced the British period system to create urban planning system of and to present an efficient combination of physical, economic and social planning at all levels [5]. It resulted in the establishment of the Provincial Urban Development Board (PUDB). Beside other things its functions included the preparation and approval of development plans for the cities [49]. In addition, other people including land developers, estate agents and builders, transporters and market operators follow their own agenda which has led to disorganized land use development and urban expansion. It has seriously affected both natural and built environment because of increasing pressure. Commercial activities of all types are growing in the city, as a result, new lobbies of different people having interest in land have appeared as influential performers to determine the new face of the city. In order to regulate and control the haphazard and unplanned development of the city and the prevention of slum formation, there is an urgent and dire need for coordination between various government agencies involved in planning and regulating urban growth and land use in Peshawar.

Besides, the different interest groups also need to be involved in the policymaking and the development process and plans carried out by these interest groups must be guided by expert guidance [50].

There is also a lack of holistic urban development due to shortage of funds and the cash-deficient City District Government has to turn to the federal and provincial governments to fund major projects of infrastructure in Peshawar city. The federal and provincial governments, in turn, have to secure funding from multilateral funding organizations to commence big urban development projects. Therefore, there is no comprehensive development plan for the city due to which the development of Peshawar city is 'project-based' and ad-hoc. As a consequence all these have resulted factors, the city environment is under severe strain. Under these circumstances, there is seriously negative impact on the quality ambient environment like water, air, land, sanitation, noise levels and ecology as well as urban design, architecture and aesthetics. Since, the problems associated with transport were not considered while devising land use schemes and policies, severe traffic congestion problems have appeared along with other related effects on the metropolitan economy and affordability. Encroachments on road coupled with intermingled local and through traffic as well as the use of low quality energy have further intensified overcrowding, interruptions and air pollution. In

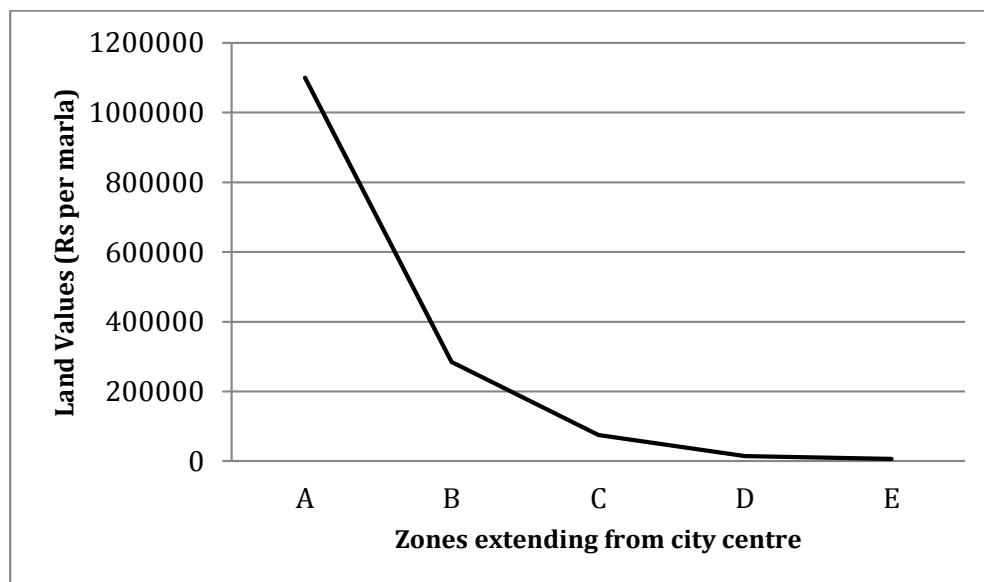


Fig 6. Peshawar City District: Land values gradient (2012)

addition, the intrusion of agricultural land by built environment is not only losing fertile farmland but also badly affecting landscape.

With respect to the market forces, rising land values and household expenses, limited investment in housing, and inadequate accessibility to housing finances point toward a significant potential distortion. According to some researchers and experts, best policy to manage land use and pattern of urban development is the Laissez faire approach. Nevertheless, in the absence of land use plan and regulations, land market economics will not only suffer enormous outer costs but will also not be able to deliver municipal facilities like major infrastructure, open spaces, parks and other urban services. Hence, in order to develop appropriate land use, there is a need to develop strategies with appropriate balance and labor division amongst the government and private sector. Although hard to achieve, it seems to be the excellent strategy to appropriately manage urban land for development.

4. CONCLUSIONS

For physical amalgamation of urban areas of Peshawar with rural peripheral area was an important objective of extending the city district boundary. Unfortunately, though, no proper land use plan could be prepared to materialize this objective and to monitor and regulate future growth due to which random land use development in has become a norm. The detailed analysis of changes in land use indicates that during the last two decades in Peshawar city, the built up area has increased by more than three times predominantly engulfing prime agricultural land. The built up and connected brick kilns were identified as the two key land uses to agricultural land in the city district. However, in spite of this loss, cultivated area has also augmented by more than 20,000 ha up to 1997 which is encouraging for sustainable development of the city. Increase in farmland has mostly occurred during the last twenty years over cultivable waste located in the southern part of the city.

A number political interests and government agencies appeared to have impacts and in many cases control over land use in Peshawar. However, and there seems to be no coordination among them which is resulting in little or no integrated land use

planning for the city. Besides, due to lack of density standards and land use regulations along with unplanned procedures have caused in disorganized development and the emergence of low-density colonies occupied by elite middle-income class. Result of all these have resulted in an automobile-dependent urban extension. The result is a shortage of land for housing and an unprecedented increase in its prices. The analysis also revealed that the built up area is encroaching upon fertile agricultural land. If this trend not curtailed in future, there is serious threat to availability of food in the city district. In the absence of a land use plan that considers land capability, the haphazard and unsustainable growth of Peshawar city is evident and uncontrollable. Therefore, the city district, will have to face huge future costs for solving problems related with haphazard spatial land use growths.

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