

DYNAMICS OF URBAN SPATIAL GROWTH AND PLANNING: A CASE STUDY OF PESHAWAR

Mohammad Aslam Khan*, Samiullah* and Zulfiqar Ali*

ABSTRACT

This paper traces the spatial growth of Peshawar, one of the major cities of Pakistan. Data and information for the study were collected from historic maps, documents and satellite images. The analysis shows that the city has been growing at a rapid pace adding about 500 ha of land annually in recent years and in the absence of planning control has seen tremendous urban sprawl. The pattern of development of urban sprawl in Peshawar is typical of most Pakistani major cities, where ribbon sprawl is common along major roads, while leapfrog sprawl is prevalent in the city's fringes. The uncontrolled expansion in the built up area is typically consuming rich agricultural land and pose a threat to food security. The study highlighting the causes of urban sprawl, discusses some of the strategic and policy options that are available to control their proliferation for sustainable development of the city in future.

KEY WORDS: Growth, Urban sprawl, Land use, Policy options,

INTRODUCTION

This paper on spatial growth dynamics of Peshawar City District is divided into four sections. The first section on introduction presents an overview of the expansion of administrative limits and built up area of Peshawar through history from 1866 till now. It discusses the history of urban sprawl with a focus on recent expansion that took place after 1991, a period during which bulk of this growth was unplanned¹. Although two comprehensive plans were prepared but they were neither approved nor implemented. However, piecemeal planning efforts were undertaken like development of Hayatabad and Regi Lalma to control the urban sprawl and accommodate growing population but these were ineffective in controlling the urban sprawl that is the characteristic of the city today. The next section highlights the material and methods used for the collection of important data and information, and analytical techniques used in this study. The following section on results and discussion analyzes the pattern of urban sprawl, as it evolved over time. It also explores the causes of urban sprawl and elaborates the policy and strategic options for improving the future urban development in Peshawar in the light of challenges faced by the City District. The main findings of the paper along with summary of suggestions have been provided in the concluding section.

SPATIAL AND ADMINISTRATIVE GROWTH

The historic growth of Peshawar can be traced in four phases. The first phase lasted from early growth to the establishment of walled city. The second phase dawned with the emergence of Peshawar's twin city 'the cantonment' that was developed to accommodate the British Colonial Rulers, who captured Peshawar in 1848. It lasted till the independence of the country in 1947. The third phase beginning with independence continued up to the Soviet invasion of Afghanistan in 1979, which triggered a large-scale migration from that country to Peshawar. The tempo of refugee movement together with internal rural urban migration considerably enhanced the growth of Peshawar after 1981 that marks the most recent or fourth phase of massive growth of the city district.

URBAN EXPANSION 1866-1947

Prior to coming of Britishers, the city of Peshawar consisted of a walled city (Figure1) with adjacent Bala Hisar fort. This area was inhabited since the Kushan times (1stAD) to the end of Sikh Dynasty in 1860². The British colonial rulers did not add much to the indigenous city. The only exception was widening of some roads. The old city within the wall covered 193 hectares of land and had a very dense population. The city wall had a number of gates and it had an oval shape extending from northeast to southwest and a radial pattern of road system.

*Institute of Geography and Urban & Regional Planning, University of Peshawar

The colonial ruler added a military cantonment in 1866 to the west of the walled city (Figure 2), where they maintained a large garrison to control the region. There were three main reasons for the selection of the site for the cantonment, firstly it was the higher ground, secondly it was uncultivated land lying waste, thirdly it was logical from strategic point of view because the possibility of invasion to the city was from the west, tribal belt or invaders coming through Khyber Pass. With the addition of cantonment, the administrative limits of Peshawar increased many fold (Table 1). It was the first major expansion in Peshawar Urban Area. The Cantonment had a gridiron pattern of roads and was the first planned expansion outside the walled city. The only major new addition to Peshawar after the development of cantonment during the second

Table 1: Peshawar: Expansion of Urban Area 1866-2009

Year	Area with in Administrative Boundaries (ha)	As % of Present City District Area	Size of Built up Area with in City District (ha)
Pre 1866	193	0.15	193
1866	919	0.72	919
1947	1,678	1.33	2,853
1981	11,100	8.83	4,635
1991	11,100	8.83	7,182
2009	126,700	100	16,986

Source: SPOT image, 2009; GoNWFP, 2001; LANDSAT image, 1991; Toposheets of various dates

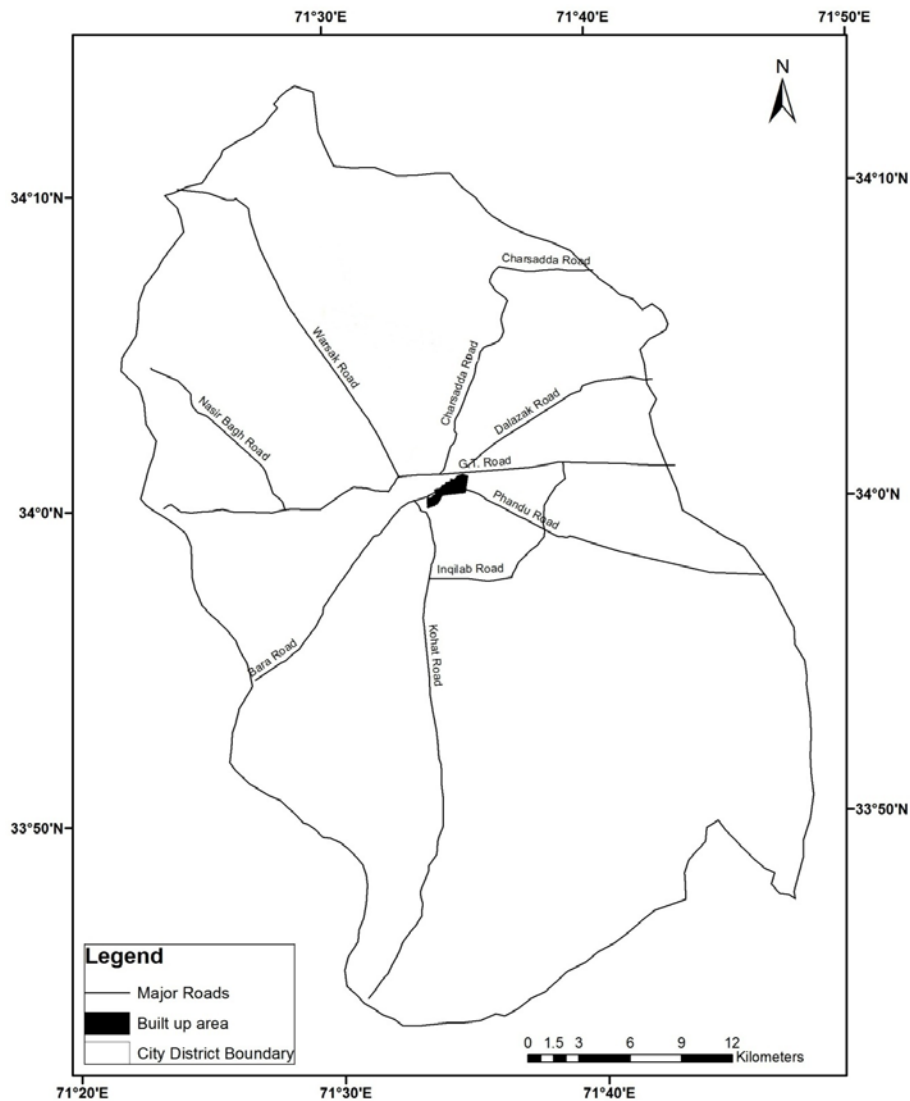


Figure 1: Built up Area Pre 1866

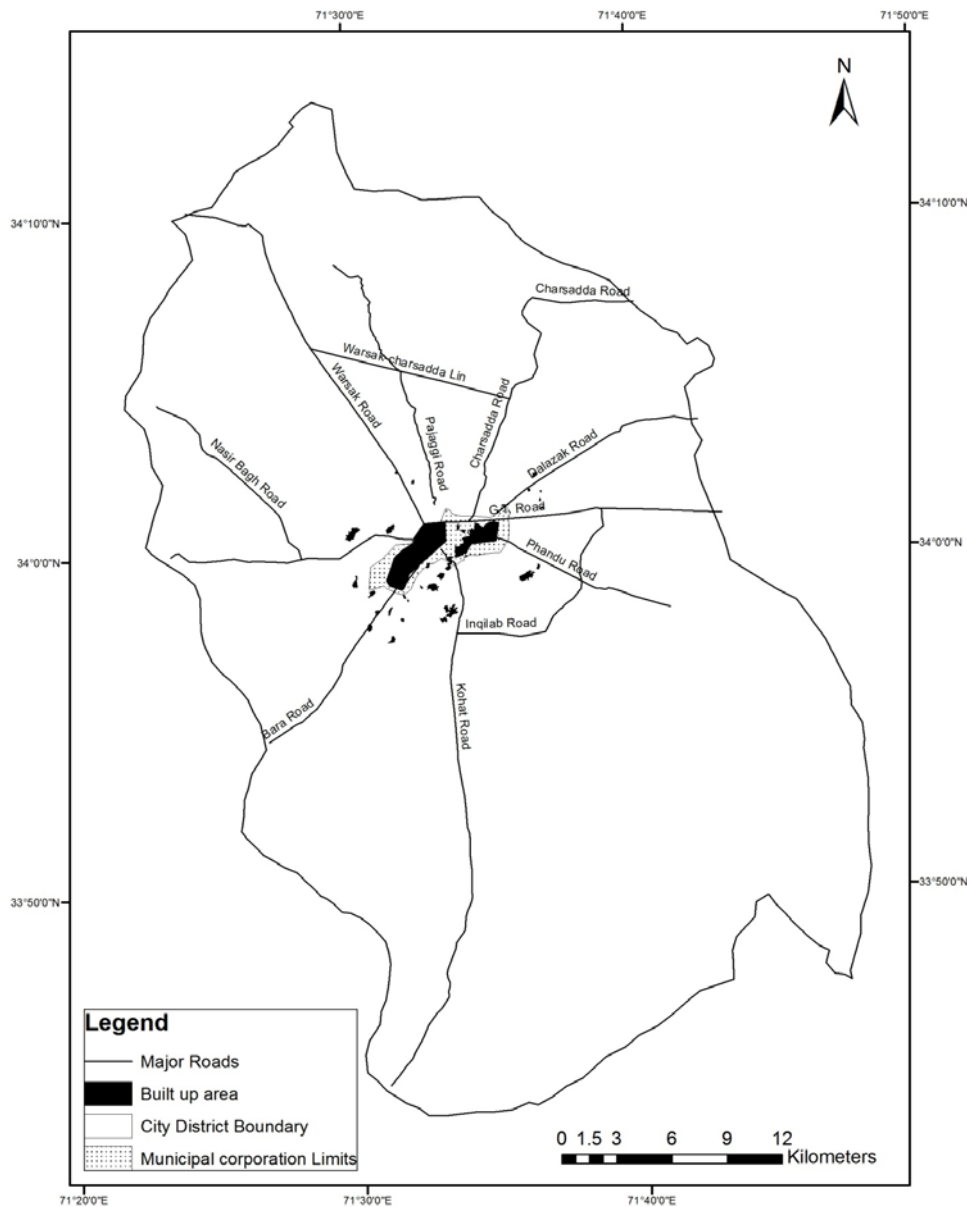


Figure 2: Built up Area 1866

phase was the establishment of Islamia College in the early years of the twentieth century (Figure 3). The location of Islamia College was on a land donated by local people. Again because of location of uncultivated wasteland in the neighbourhood of Islamia College that resulted in the expansion of residential areas like University Town and later on Hayatabad close to Islamia College. Once the inertia of growth development along the western side started, it continued till the barrier of tribal belt reached (Figure 2).

URBAN EXPANSION 1947-1981

After independence from the British rule in 1947, Peshawar continued as capital of the then North West Frontier Province (now Khyber Pakhtunkhwa). This resulted in an increase in the City’s administrative and financial functions and promoted a relatively faster growth in built up area, which increased from about 2,853 hectares in 1947 (Figure 3) to 4,635 hectares in 1981 (Figure 4). During this period, (1947-81)

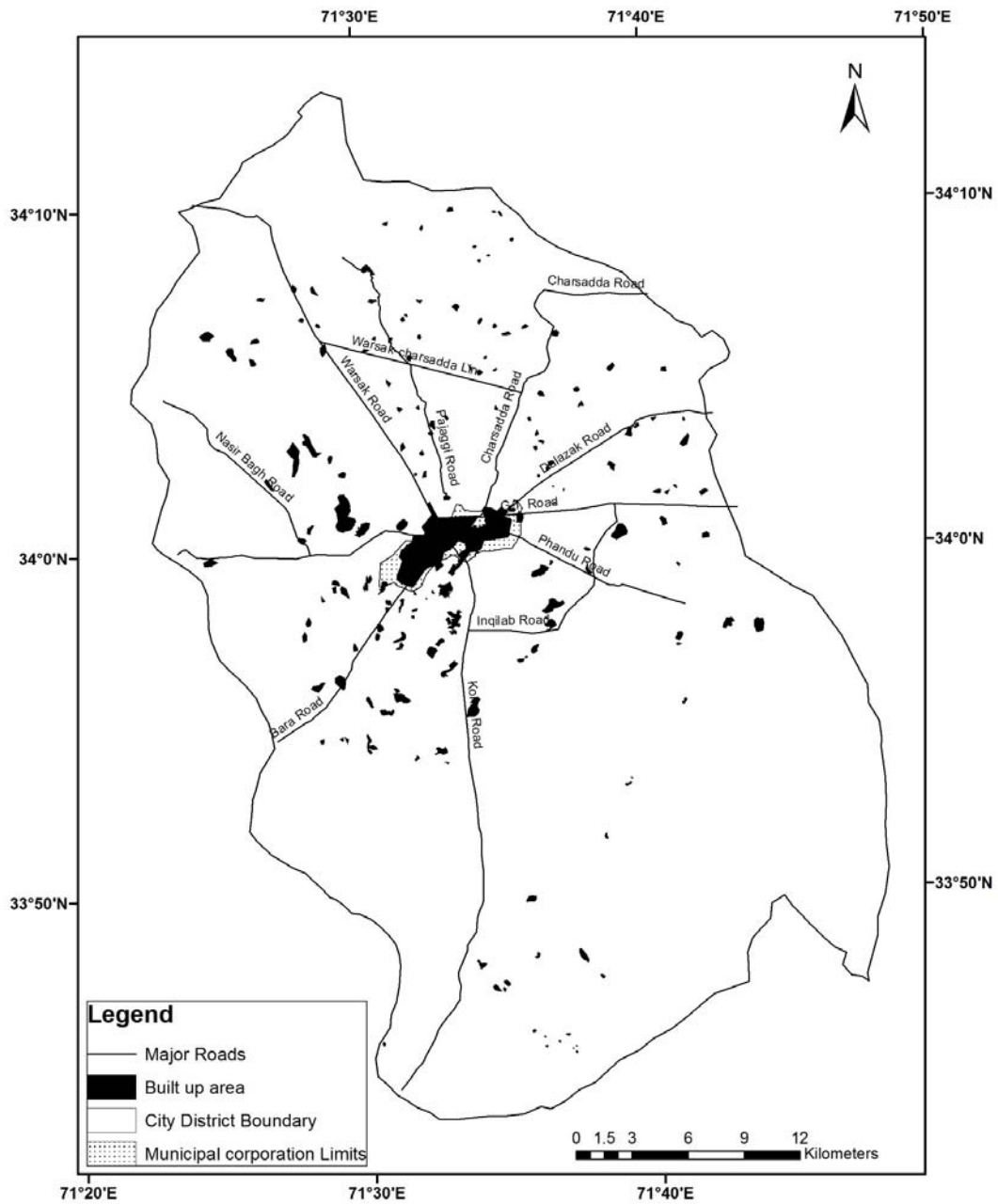


Figure 3: Built up area 1947

expansion in built up area was at the rate of 23.6 hectares per year, which was more than double over the previous period. The expansion in built up area was also accompanied by a major boundary extension in 1981 (Figure 4), which resulted in expansion of urban administrative area of Peshawar to 11,100 hectares (Table 1).

Several new nuclei of development were initiated during this phase. Among these were University Campus, University Town, Hayatabad Township and two industrial estates on Kohat and Jamrud Roads. The factors for growth of these areas on the west have broadly been given. The industrial estate of Kohat road was established by the government. A number of peripheral villages such as Tehkal Bala,

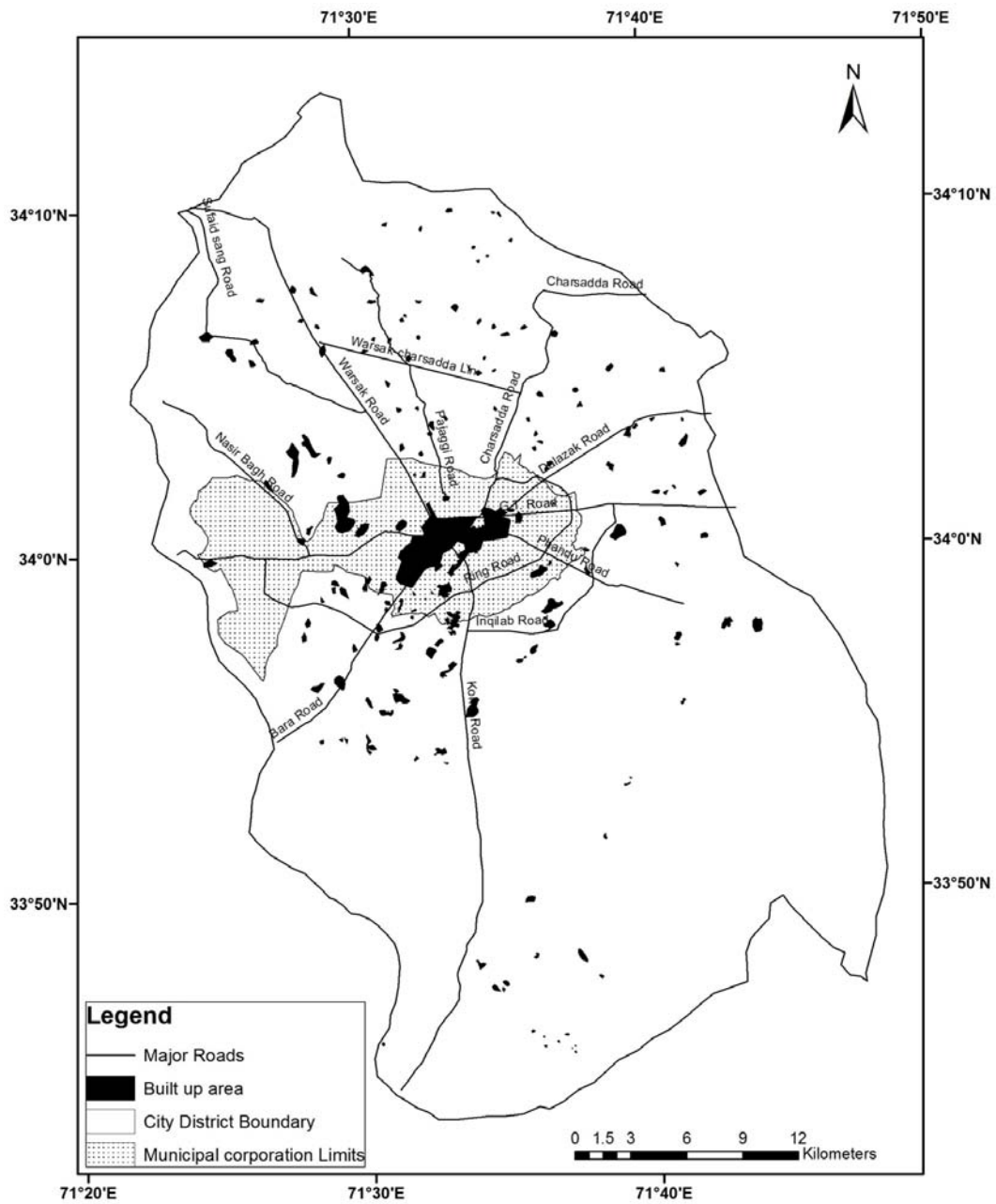


Figure 4: Built up Area 1981

Tahkal Payan, Hazar Khwani, Nauthia, Landi Arbab, Chughalpura, Sardar Garhi, Babu Garhi, Pahari Pura, Deh Bahadur, Malakander and Pakha Ghulam were also engulfed into expanding city. Residential expansion also started around the walled city and cantonment. Among the new residential areas were Nishtar Abad, GulBahar Colony, Sheikh Abad, Zeryab Colony, and Faqir Abad in the East and Gulberg, Danish Abad, and Shaheen Town, Nauthia Jadeed etc. in the west.

A Master Plan was developed for Peshawar in 1965, covering the period 1965-85 to streamline the growth of the city³. Among others, the Plan indicated the new potential growth boundary of the city (Figure 5), as did the Structure Plan of 1986⁴. Unfortunately, neither of these plans were approved or implemented and unplanned growth of the city continued in all directions particularly along the radial roads leading out of the city.

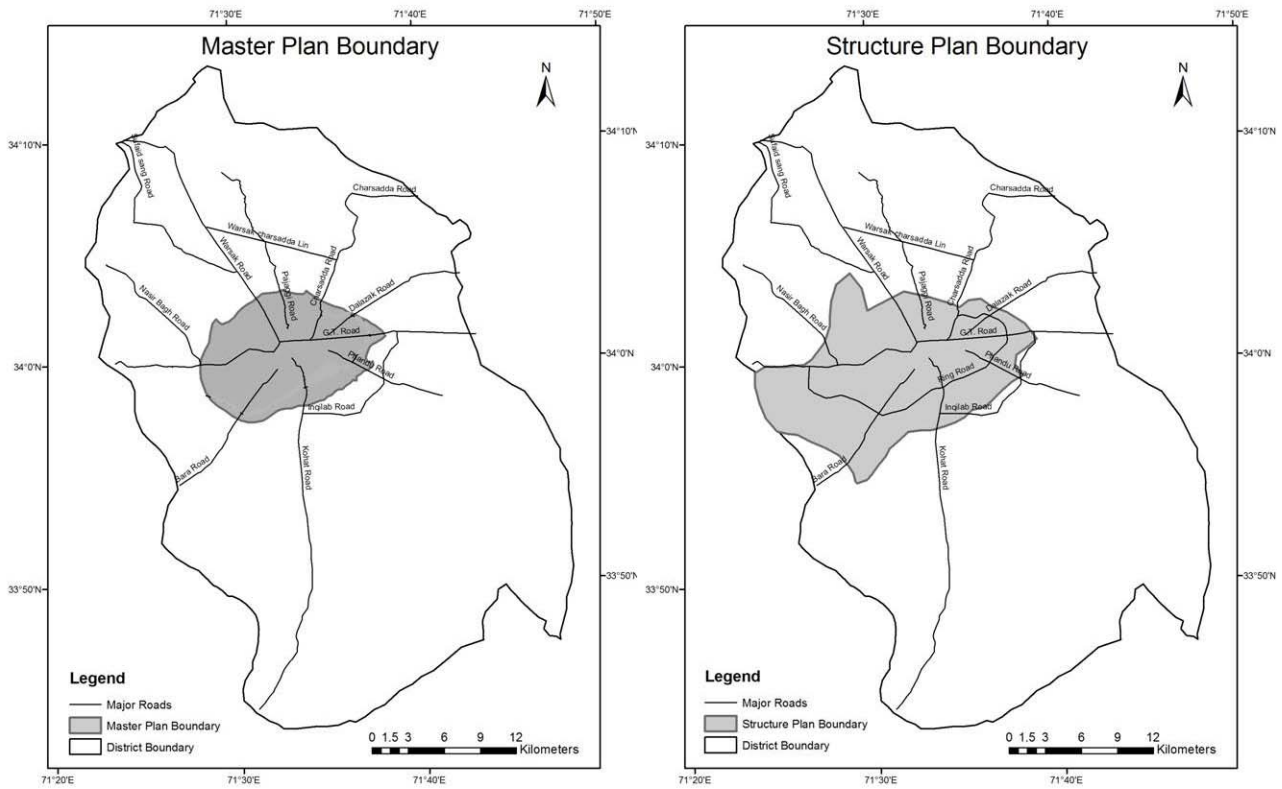


Figure 5: Physical Expansion Limit as Proposed in Master Plan 1965-85 and Structure Plan, 1986-2001

URBAN GROWTH 1981-TO DATE

The physical growth of Peshawar was quite high during this phase (Figure 6 & 7) compared to the previous period. Huge influx of Afghan refugees was the main contributor. The refugees settled not only within the main city but also in the fringe areas of Peshawar. The result was that the built up area increased to more than one and a half time in just 10 years between 1981 and 1991 from 4,635 hectares to 7,182 (Table 1) accounting for an addition of 250 hectares of built environment every year. With the exception of Hayatabad, most of this expansion was unplanned. It not only continued along radial roads but also started rapid encroachment on prime agricultural land (9,122 hectares were lost between 1991 & 2009) with its ramification for the food security.

The fastest growth in built environment of Peshawar (Table 1 and Figure 6 & 7), took place in the last twenty years, whereby it doubled, increasing at

the rate of 545 hectares per year. The urban sprawl during this period also occurred along the newly built Ring Road that attracted considerable development along its sides. The linear urban sprawl along the roads resulted in massive increase of traffic and enhanced congestion and pollution to an alarming level. The encroachment of prime agriculture land by urban sprawl also continued

MATERIAL AND METHODS

Data for this research was collected both from primary and secondary sources. Secondary data was obtained from various sources including District Revenue Office, Peshawar; Peshawar Development Authority (PDA); Survey of Pakistan; Soil Survey of Pakistan and Population Census Organization. City District boundary map and land use data for previous years was collected from records of District Revenue Office population data was obtained from population census organization and infrastructure data was ob-

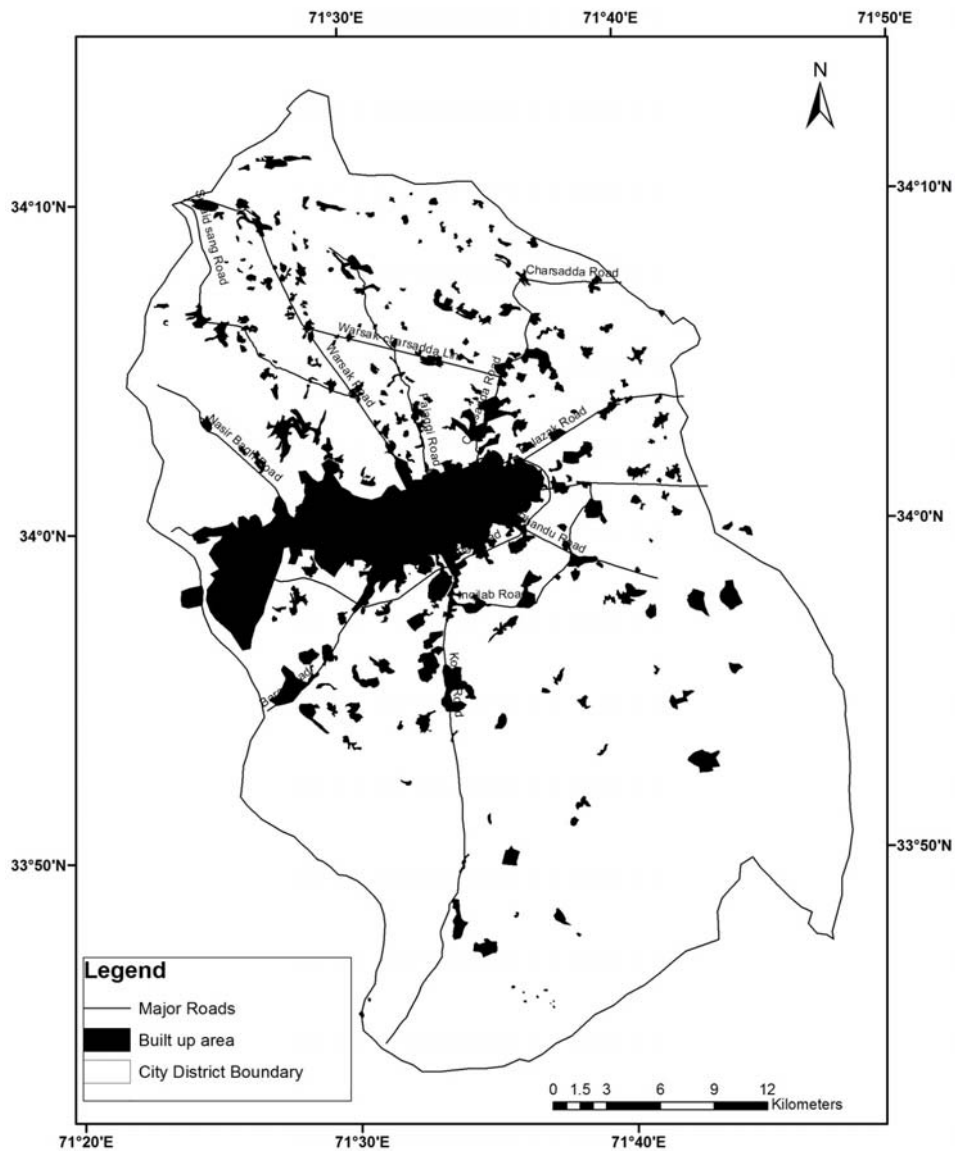


Figure 7: Built up area 2009

obtained from satellite images and analyzed using the aforesaid GIS software. The data analyzed were presented in the form of maps, diagrams and statistical tables.

RESULTS AND DISCUSSIONS

Based on the historical growth of Peshawar City District, this section discusses the pattern of urban sprawl, its main causes and the policy and strategic options available to control the unplanned urban growth.

PATTERNS OF URBAN SPRAWL

Urban expansion takes place either under objective planning, guided and regulated by development control or through spontaneous growth with unplanned isolated constructions, especially along the roadsides and in the city fringes. The later appears to be true for Peshawar, where urban sprawl has occurred due to scattered development of various types. Initially the growth in population of Peshawar was absorbed within the boundaries of the walled city or Cantonment area. Urban sprawl started gaining ground

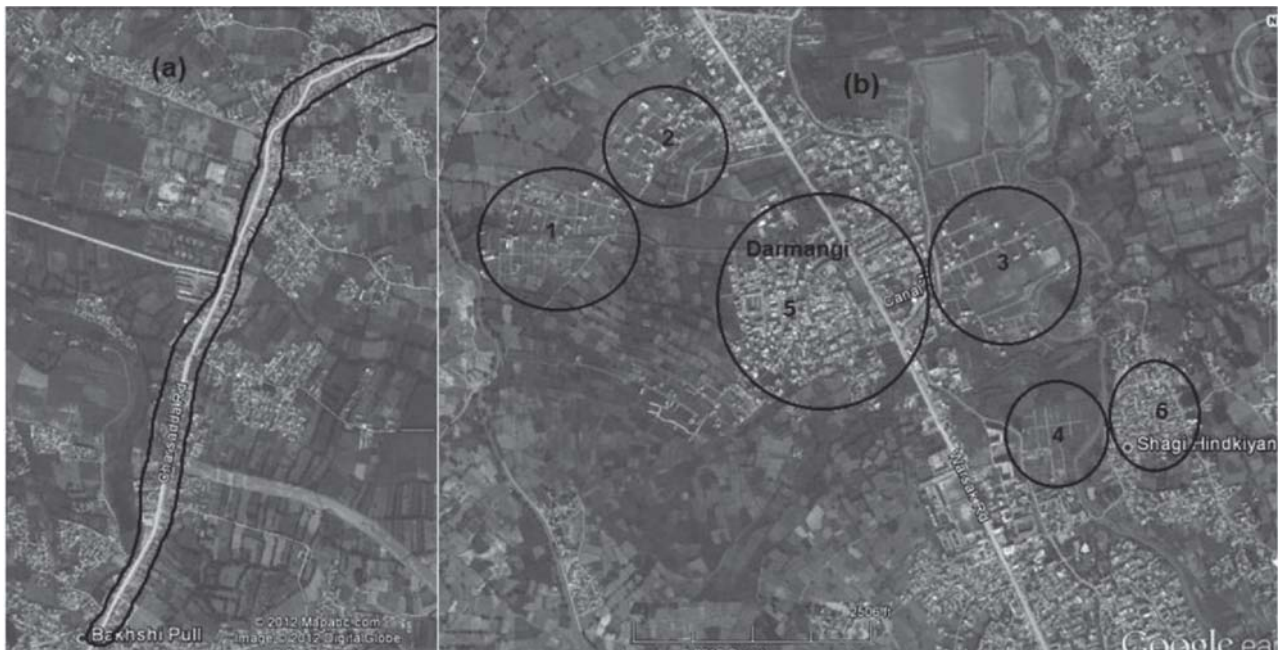


Figure 8: Characteristics of Urban Sprawl (a) Ribbon Developments along Radial Roads, (b) New Unplanned Residential Extensions (1-4), as well as Engulfed Villages (5 and 6)

in 1960s with the development of ribbon sprawl or developments along the major spinal roads radiating outwards from the city such as Grand Trunk Road, Kohat Road, Bara Road, Pajagi Road, Warsak Road, Delazak Road and Phandu Road. Rural agricultural land in the fringe was expected to check this elongated pattern of urban sprawl. However, inefficient planning and urban management not only failed to achieve this but encouraged speculators to encroach upon prime agricultural land. It also resulted in the development of residential developments in the fringe areas in leap-frog fashion with minimum of infrastructural facilities resulting into harmful environmental and social consequences.

An important consequence in this regard was the development of varied land use association side by side whereby new disorganized residential extensions (except a few planned ones such as Hayatabad and Defense Colony), old villages, industry and commerce, city services and farming are not neatly sorted out into homogenous areas but intermingled in a random fashion (Figure 8). The haphazard growth often resulted in the development of slums or undesirable residential areas with lack of services and amenities,

piecemeal commercial development, and intermixes of conforming and non-conforming land uses.

An example of residential extension that has become a slum is Shaheen Muslim town (Shah Dhand). Located just outside the walled city in the east, it was built on low-lying dissected land that provided clay to former brick kilns. Construction of drainage system in this low level land was extremely difficult, as a result the neighborhood developed without proper drainage system. With expansion in the population of the area numerous problems emerged, the most important being stagnant water. Roads and streets in the area are also narrow, irregularly laid out without any geometric pattern. The area also lacks in urban services. Creating such urban extensions/places without adequate urban infrastructure is a “recipe for slums.”

There are two main reasons for the development of such urban extensions. The first and foremost is the non-availability of good low-cost land for housing. As a result people have no option but to purchase land for housing that are hazardous such as abandoned brick kilns with lands in depressions created by kilns, where sanitation development is too expensive. The second being the lack of access to

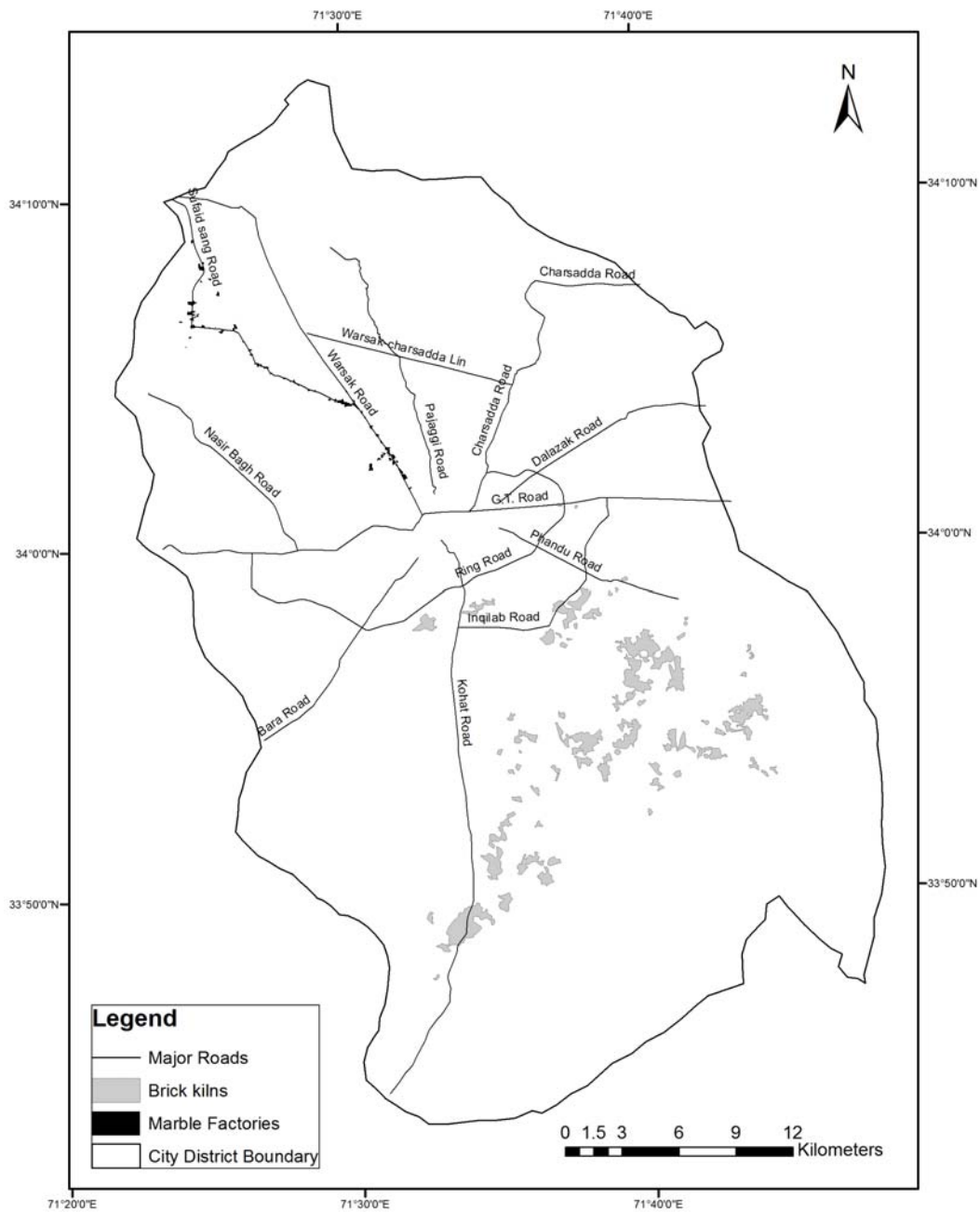


Figure9: Location of Brick Kilns and Marble Factories in Peshawar City District

affordable financing by the poor that can enable them improve their housing. Like Shah Dhand or Shaheen Muslim Town, there are some other areas on Kohat Road that have also been developed on abandoned brick kilns.

A number of old villages have also been engulfed in the growing urban sprawl. These villages,

which were once surrounded by agricultural lands, have lost most of them. Structure of these villages is an example of unplanned growth. Usually the streets and roads do not have a geometric shape and are often unpaved. Many houses in these villages are katcha with poor infrastructure facilities such as sanitation and waste disposal. Moreover, after re-designation of the urban area as City District, many fringe

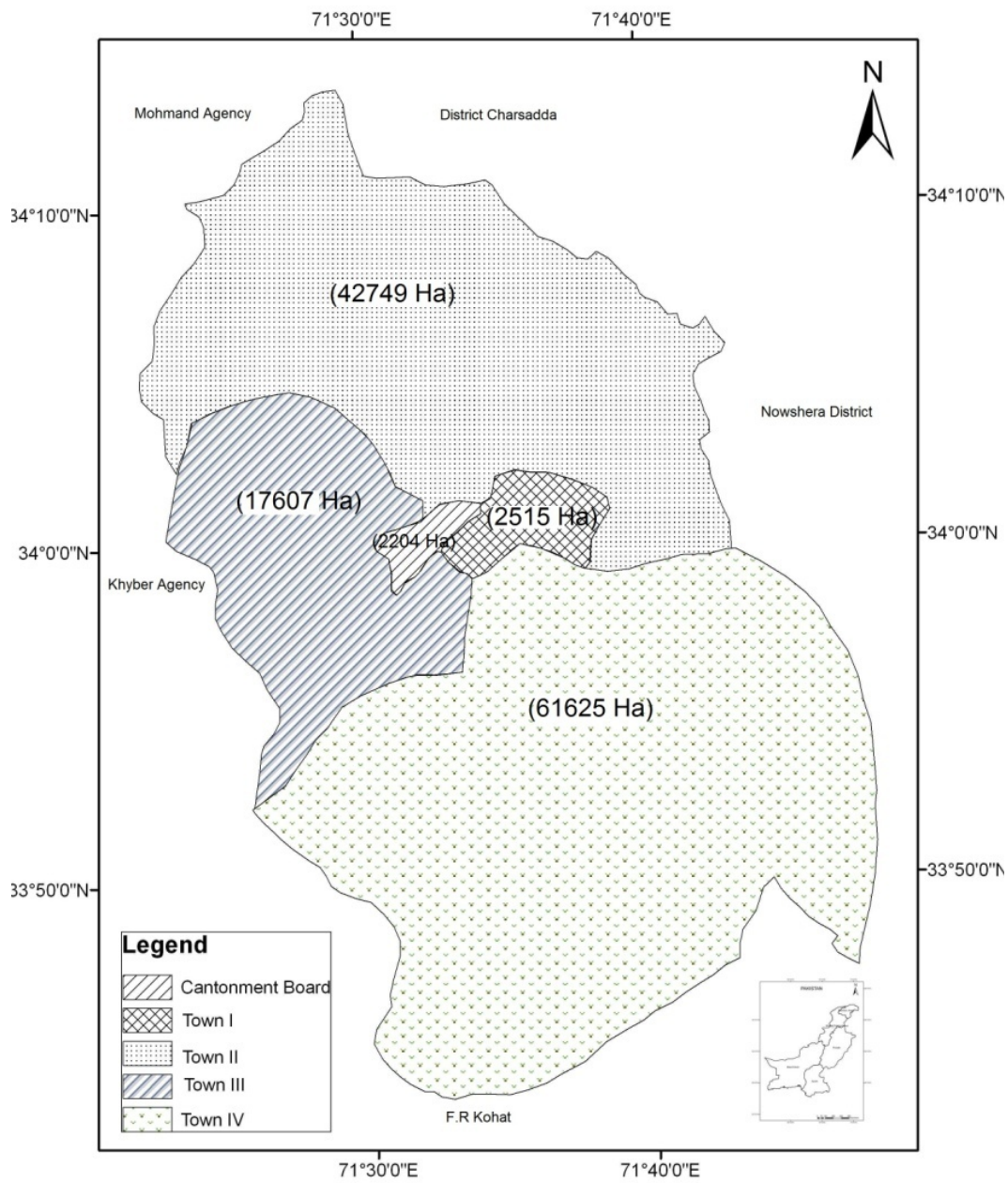


Figure 10: Peshawar City District, Towns

villages have also become part of Peshawar. These villages are surrounded by agricultural land, which need protection from the onslaught of urbanization.

Major examples of industries that have intermingled into urban sprawl are brick kilns and marble factories. Data about expansion in the number of marble factories and brick kilns was obtained during the field survey. In view of rising demand of bricks

for construction, their number increased from 400 in 1991 to over 1,000 at present while their areas enhanced (Figure 9) from 850 hectares to about 2,400 hectares over the same period. They are primarily located in the southern part of the City District because of availability of clay in the area. Marble industry has also flourished with construction boom. Their area increased from 85 hectares in 1991 to the present 132 hectares. They are concentrated in the northern

Table 2: Peshawar City District Population Growth 1951-2012

Years	Popula- tion size (in thou- sands)	Interce- nsal in- crease (%)	Cumula- tive incr- ease (%)	Annual growth rate (%)
1951	391	-	-	-
1961	529	35.29	35.29	3.08
1972	807	52.55	106.39	3.70
1981	1,113	37.92	184.65	3.89
1998	2,019	81.40	416.37	3.56
2012(Est)	2,765	34.94	707	3.56

Source: Population Census Organization, 1952, 1962, 1973, 1983, 2000.

parts of the city district along Warsak and Sufaid Sang roads (Figure 9), because of availability of raw marble in the areas nearby.

CAUSES OF URBAN GROWTH AND SPRAWL

The comprehension of growth dynamics of urban sprawl demands an analysis of their causes. Several scholars have discussed the general causes and catalysts of urban growth and sprawl^{5,6,7,8,9,10}. The main causes of urban sprawl in case of Peshawar can be broadly grouped into three categories - economic and market; demographic and social; and policy and planning cum legal.

ECONOMIC AND MARKET FORCES

Economic and market forces include those factors which affect the supply and demand of housing or land for housing such as rising income, inflation in price of land etc. Economic growth enhances urban sprawl because it leads to rising per capita income that increases the demand for new housing as well as more housing space^{11,12,13}. In Peshawar, this encouraged developers to speedy construction of new housing units and other infrastructure without proper planning and coordination among developers, governments and individuals. Another serious outcome of this scenario of rapid construction was speculation, manipulation of real estate and fast increase in the price of land. The real estate business has been dominating the economic scene during the last three decades in

Peshawar city district during which their number increased from a few to several hundred presently. In 1991 the total number of real estate agents were about 50 which increased to over 350 in 2010. With lax development control, the developers have been channelizing the growth pattern of the city according to their will. One result of this is ribbon sprawl for commercial expansion along all major roads leading out of the city. It has also encouraged some estate agents and property-owners to hold back parcels of lands from the market resulting in discontinuous and fragmented urban sprawl as is witnessed in the number of empty plots in newly developed private housing development.

TRANSPORTATION AND FACILITIES

A major factor that has promoted urban sprawl is the increased transportation and infrastructure and service facilities. The enhanced car ownership as well as increase connectivity has made it easy for the people to commute to work. In addition, enhancement of water supply, electricity and gas network as well development of educational facilities through opening of government as well as private schools has allowed people to move out in the fringe areas of the city.

DEMOGRAPHIC AND SOCIAL

Demographic factor is one of the principal causes of urban sprawl in Peshawar. Official statistics show growth rate at over 3 percent (Table 2). The figure excludes influx of Afghan refugees, which means that the growth rate is much higher in the recent years. Such high growth rate obviously puts heavy pressure on demand for housing and encourages urban sprawl.

Lack of affordable housing (those, which can be purchased by the median income group) has also been one of the most important causes of urban sprawl in Peshawar. It has also led to intra-city mobility. Initially the people were reluctant to move from their traditional homes. But as the population inside the walled city enhanced, non-availability of space compelled citizens to construct their residences in the periphery of the city in the newly sprawling suburbs. The housing units were also very small in the heart of the city or near it. Therefore, inhabitants have moved towards urban fringe for extra living space.

Since the land values outside the city were also low, therefore, people tend to purchase more land and build relatively larger houses in the urban sprawl. Further, once the inner city dwellers started moving. They also pulled their relatives and friends to new locations. Moreover, as mentioned earlier the growth of social facilities and services also encouraged people to move to new areas.

POLICY AND PLANNING CUM LEGAL

Lack of consistent policies and planning has also caused urban sprawl in Peshawar. In the absence of implementation of the aforesaid Master Plan and the following Structure Plan, the stakeholders both public and private particularly real estate developers have taken their own decisions about the future growth of the city. This freedom eventually resulted in the development of uncontrolled and spontaneous urban growth and sprawl. Further, the Public regulation have not strictly controlled and regulated the fringe areas of Peshawar as strictly as the walled city, cantonment and Hayatabad. Therefore, many developers and individuals have taken the opportunity to construct housing units and colonies to suit their own need contributing to urban sprawl.

The satellite towns of Hayatabad and Regi Lalma were planned to absorb overspill population of the city and contain urban sprawl. Only Hayatabad was developed among the two, but it proved to be a drop in ocean in the wake of massive growth in population and demand for land for residential and other purposes. Hayatabad Township was designed and planned by Peshawar Development Authority (PDA) in 1981. After British cantonment, it was the first major planned expansion of the city. The Township developed in grid iron pattern and consists of seven phases.

Legal disputes over land tenure problem have delayed implementation of Regi Lalma project resulting in outgrowth of built up area leaving the undeveloped land inside the city. According to PDA, the land tenure system of the area was so complex that it took over 10 years to settle the disputes.

POLICY AND STRATEGIC OPTIONS

As mentioned earlier, in the absence of comprehensive plans, the planning measures of providing

developed land to people for housing in Hayatabad and Regi Lalma failed to meet the growing need of housing in the city district. The past planning practice in Peshawar, as discussed above has failed to achieve the objectives of appropriate urban development. The resulting urban sprawl to cater for the need of increased housing is a serious threat to the sustainable development of the city, as once unplanned built up areas are proliferated, irreversible changes take place. Sprawl also has serious implications in economic, social as well as environmental terms. Economically, it is leading to inefficiency in energy use and causing inflated infrastructure costs. Socially, the deficit in urban infrastructure and services is eroding livability, productivity and efficiency of the city. Environmentally, degrading urban ecology is apparent due to the encroachment of agricultural land, development of substandard housing, slums and shantytowns, deteriorating air and water quality and inadequate management of waste. The key factors responsible for failure of planning relate to lack of political will along with institutional and policy failures. These have led to excessive delays in plan preparation and approval process, poor institutional set up, lack of coordination among government agencies, failure to generate adequate funds and legal and regulatory shortcomings. Implementation of plans is so slow that it takes many years to complete, for instance the development of Regi Lalma township.

IMPLEMENTATION OF URBAN DEVELOPMENT PLANS

Effective spatial development plans help guide appropriate expansion of cities and implement wise land-use policies. Two spatial development plans were prepared for Peshawar - a Master Plan³ and a Structure Plan¹² for the proper development of the city. They were not implemented because none of them were eventually approved. The first plan instead of suggesting measures to stop harmful urban sprawl, concentrated on speedy provision of necessary infrastructures and services. Hence the unauthorized urban sprawl continued throughout the plan period 1965-85.

The Structure Plan prepared in 1986 for the period 1986-2001 attempted to abate many shortcomings of the previous 1965-86 Master Plan for the city. It

pointed out, “there is no significant program of development of any scale, which could provide housing for lower income families.” As a result, much of the urban growth of Peshawar had been piecemeal and of poor construction, and also occurred in a haphazard and uncontrolled manner. Provision of necessary infrastructure in these areas was becoming significantly difficult and expensive¹⁴. The plan designated 6 growth zones and 11 local planning units in Peshawar urban area and proposed the development of local plans urgently for critical units. It also identified the problems of the private land development control.

The implementing agency of the Plan did not succeed in getting its approval. Hence many good proposals for the development of the city could not be implemented and the city continued to expand in its own fashion towards its peripheries in the absence of planning control. While, it is imperative to investigate the reasons for non-implementation of these plans; it is also necessary to prepare and implement anew spatial development plan in order to control urban sprawl, promote the best land use, and have judicious distribution of urban infrastructure and services and their smooth management.

INSTITUTIONAL ARRANGEMENTS FOR URBAN PLANNING AND MANAGEMENT

The City District Government, Town Management Administrations (TMAs), Peshawar Development Authority, Cantonment Board and Defense Housing Authority are the institutions that are responsible to make urban development plan and schemes for urban service delivery in their own jurisdiction. This compartmentalized institutional system has resulted not only in fragmented planning and development and wastage of resources, but also failed to check urban sprawl. This problem of fragmented management can be removed through placing development departments under one agency. This agency could be City District Government (CDG) or a new autonomous authority. The proposed CDG or a new autonomous authority should have a separate unit to take care of the affairs of the urban fringes with consistent monitoring of land use. This would also promote an effective system of co-ordination and streamlining the overall urban growth.

LEGISLATION AND REGULATION

Legislation and regulation are important tools and instruments for planning of urban areas and to regulate their growth and associated sprawl¹⁵. It is evident from the case of Peshawar that implementation of a development plan without effective legislation is a difficult task. This was remedied in the Local Government Ordinance (LGO) 2001¹⁶ under which Peshawar City District was created. The city was divided into four towns, with a City District Government (CDG) at the district and four Town Municipal Administration (TMA) at the town level (Figure 10). TMAs were required to prepare a master plan for the area within their jurisdiction and get it approved from their respective Councils. Therefore, it is essential to give greater administrative and financial autonomy to the local government at Peshawar for playing an effective role in city development and make necessary amendments in existing laws and procedures, as suggested by the Planning Commission Task Force on Urban Development¹⁷.

GROWTH MONITORING AND SMART GROWTH AUDIT

Growth monitoring through remote sensing and GIS provide important tools that can provide information to the planners and the decision-makers on the state of development and the nature of change in the urban milieu^{18,19,20,21}. This can enable the planners to effectively regulate, manage and guide the urban development process. In addition, the new technique of smart growth audit should be adopted to ensure the use of a set of defined “smart growth principles or standards.” These may include neighborhood livability; better access, less traffic; thriving cities, suburbs, and towns; shared benefits; lower costs, lower taxes; preserving open space etc^{22,23,24}.

CONCLUSIONS AND SUGGESTIONS

Urban expansion in Peshawar resulted from spontaneous growth with unplanned isolated constructions, especially along the roadsides and in the city fringes. The urban sprawl first set its foot in 1960s along the major roads radiating out of the city and cantonment. It then started expanding in a leapfrog fashion encroaching upon agricultural lands in the

fringe with minimum of facilities and all the harmful environmental and social consequences. It led to the emergence of varied land use association whereby new residential extensions (except a few planned ones such as Hayatabad and Defense Colony), old villages, industry and commerce, city services and farming intermingled in a random fashion. The haphazard growth often resulted in the development of slums or undesirable residential areas with lack of services and amenities, piecemeal commercial development, and intermixes of conforming and non-conforming land uses.

The main factors responsible for the development of urban sprawl in Peshawar can be grouped into three categories - economic and market; demographic and social and planning, institutional and legal. Economically the growth in income enhanced housing demand and encouraged developers to undertake fast construction of new housing units and other infrastructure without proper planning. A serious outcome of this scenario of rapid construction was speculation, manipulation of real estate and fast increase in the price of land. High demographic growth rate at over three percent also put heavy pressure on demand for housing and encouraged urban sprawl. In the absence of implementation of master or local plan, the stakeholders both public and private particularly real estate developers took their own decisions and contributed to urban sprawl.

The key factors responsible for failure of planning relate to institutional and policy failures. Poor institutional set up, lack of coordination among government agencies, inadequate funds and legal and regulatory shortcomings were other constraints in the way of plan preparation, approval and implementation. Sustainable growth of Peshawar and success of future planning endeavors including control of urban sprawl in the city will hinge upon alleviation of these problems and require:

- Generation of political will among all stakeholders particularly decision makers and politicians through dissemination of information and creation of awareness.
- Rationalization of present institutional framework with overlapping jurisdictions by placing development departments under one agency. This agency could be City District Government (CDG) or a new autonomous authority.

- Enhancement of institutions technical capacities for planning and implementation and making a solid case for the approval of suggested plans Establishment of a coordination mechanism to rationalize and link the decision-making processes with the budget, infrastructure improvement and land management.
- Evaluation of the efficacy of planning and zoning regulations to check conversion of agricultural land, development standards, land registration/transfer procedures, rent control laws, property taxation, etc.
- Enactment of legislation for the formulation, approval, implementation, review and monitoring of spatial plans. The local government Ordinance 2001 had empowered the Town Management Administration to prepare and approve the development plans of the area within their own jurisdiction but the ordinance has expired and needs to be replaced accordingly.
- Provision of adequate funds or empowerment of local government to generate funds for development projects for controlling urban sprawl
- Adoptions of a development strategy to implement action for solving the urban sprawl problems in order of priority. The prioritization should be based on three factors - needs of the people of Peshawar, amount of available resources and capacity for implementation.
- Utilization of remote sensing and GIS and Smart Growth Audit as tools for monitoring of growth and creation of link between planning and implementation in a rational way.

REFERENCES

1. Samiullah, 2000. *Urban Sprawl in Eastern Part of Peshawar City. M.S Thesis Submitted to Department of Geography/Urban & Regional Planning, University of Peshawar.*
2. Dani, A.H, 1995. *Peshawar: Historic City of the Frontier. Sang-e-meel Publishers, Lahore.*
3. GoNWFP, 1965. *Master Plan, Peshawar.*
4. GoNWFP, 1986. *Peshawar Structure Plan and Programme, Peshawar Development Authority.*

5. Barnes K. B., Morgan III J. M., Roberge M C., and Lowe S, 2001. *Sprawl development: Its patterns, consequences, and measurement*, Towson University.
6. Brueckner, Jan K. 2000. "Urban Sprawl: Diagnosis and Remedies." *International Regional Science Review*.23:2, pp. 160-71.
7. Burchfield M., Overman H. G., Puga D. and Turner M. A. 2006. *Causes of sprawl: A portrait from space*, *Quarterly Journal of economics*, 121 (2), 587-633.
8. Ewing R., Pendall R. and Chen D. 2008. *Measuring Sprawl and its Impact*, Smart Growth America: Washington DC.
9. Rahman G, Deanna Alam and Sirajul Islam, 2008. *Urban Growth without Sprawl A way Towards Sustainable Urbanization*, 44th International Society of City and Regional Planning (ISOCARP) 19-23 September 2008, Dalian, China
10. Squires, G. D. 2002. *Urban Sprawl: Causes, Consequences and Policy Responses*. Washington, DC: Urban Institute Press.
11. Black, J. Thomas., 1996. "The Economics of Sprawl." *Urban Land*. March, 55:3, pp. 52-53.
12. Bhatta B, 2009. *Analysis of Urban Growth and Sprawl from Remote sensing Data*. *Advances in Geographic Information Science*. <http://www.springer.com/978-3-642-05298-9>
13. Giuliano G. 1989. *Research and Policy Review 27: New Directions for Understanding Transportation and Land Use*. *Environment and Planning A* 21: 145-159.
14. Saxena, Aruna , 2008. *Monitoring of urban fringe using Remote Sensing and GIS techniques*, Research Paper, 2008
15. GoWP, 1960. *Municipal Administration Ordinance (MAO) 1960*, Lahore.
16. GoNWFP, 2001, *Local Government Act, 2001*.
17. GOP (Government of Pakistan), 2011, *Task Force Report on Urban Development*, Planning Commission, Islamabad
18. GoNWFP 1979. *Local Government Ordinance*, Islamabad.
19. Nigam, R. K. 2008. *Application of Remote Sensing and Geographical Information System for land use /land cover mapping and change detection in the rural-urban fringe area of Enschede city, The Netherlands*, Planning and Management Department of Land Resource & Urban Sciences, International Institute For Aerospace Survey and Earth Sciences (ITC), Enchede, The Netherlands.
20. Angel, S., Parent, J., & Civco, D. 2007. *Urban sprawl metrics: an analysis of global urban expansion using GIS*. *Proceedings of ASPRS 2007 Annual Conference, Tampa, Florida May 7-11*. http://www.sciencedirect.com/science?_
21. Sudhira H. S., Ramachandra T. V. and Jagadish K. S. 2004 *Urban sprawl: metrics, dynamics and modelling using GIS*, *International Journal of Applied Earth Observation and Geoinformation*, 5.1, 29-39.
22. Lata K. M., Prasad, V.K. Badarinath, K. V. S. Raghavaswamy, V, 2001. *Measuring urban sprawl: A case study of Hyderabad*, *GIS development*, Vol. 5(12).
23. Guilbeau, M A, 2008, *Policy and Practice Smart Growth Audit*, Department of Public Works City of Baton Rouge, USA
24. Ewing,R., 1997. *Is Los Angles-Style sprawl Desirable?* *Journal of the American Planning Association*, 63(1):107-126.