

## **Geographical Analysis of Commercial Structure in Clifton, Karachi**

AZRA PARVEEN AZAD & AND RAZZAQ AHMED\*\*

\*Department of Geography, University of Karachi.

\*\*Department of Geography, Federal Urdu University of Arts Sciences & Technology, Karachi

### **ABSTRACT**

This study has been under taken to identify the evolution of landuse during the period 1985-2002 in the planned neighborhood of Clifton. It is worth noted that land occupied by commercial activity was increased dramatically during this period. In this study we wish to explore the major transformations in the retail landscape partly brought about by the broad trends in consumer behavior. It has been observed that many shopping centers and malls located in Clifton have been designed on most modern lines like western cities. This study also focuses on selected blocks of Clifton, Karachi. The information both qualitative and quantitative utilized in the study of commercial structure has been gathered through extensive field survey. Modern methods like GIS and computer assisted cartographic techniques have been used in this study.

This detailed study of the retail structure of Clifton will provide a guideline to business community to select the type of commercial functions and their locations in Clifton. The study will also be useful for future researchers, along which they can conduct, their more elaborate studies of the evolving commercial land use in different parts of the mega cities of the developing world.

### **Introduction**

Spatial distribution of commercial functions depends upon status and behavior of the consumers of certain area. They are the lifeblood of the retail industry. Their preferences, choices and behavior primarily influence the way in which the retail landscape develops. It is therefore essential for all retailers to know how consumer characteristics are likely to change over the next few years and develop strategies to exploit the change. Urban geographers are directly concerned with the way spatial distribution of functions in cities has changed over time. Changes in the spatial arrangements in urban areas reflect changes in overall socio-economic conditions as well as spatial pattern of land values in major metropolitan centers (Himmiyama, 1996).

Planner's most formidable task in Karachi has always been to cater to the unprecedented population. The neighborhoods, planned in 1950's and 1960's such as North Nazimabad, PECHS and Clifton, have undergone a substantial change in land use specially the commercial structures (Azad, 2005). Clifton is a high-income residential area despite the fact that it has its share of squatter settlements. Clifton and its diplomatic enclave monopolizes in respect of foreigner's residences. For a long time it successfully resisted the spread of commercial activity. However during the last one-decade and a half, commercial activity has almost engulfed the entire neighborhood, particularly along the main streets, namely Khayaban-e-Iqbal, from Clifton Bridge to Do Talwar; also along Khayaban-e-Roomi and Jami (Fig. 1).

These commercial areas mostly offer goods, which serve the needs of women such as ladies shoes and garments, beauty parlor and hair dressing saloons. In addition, there are grocery stores, general stores, eating places, confectionary, ice cream parlors, banks and cassettes/CD's stores, jewellery, eye glasses and photographers' studios.

According to estate workers the commercial establishments located along Khayaban-e-Iqbal from Teen to Do Talwar enjoy good demand and fetch as high as Rs. 0.8 million to 0.9 million per store. The stores which are located along service roads, cost Rs. 0.6 million. While, the stores placed in the inner side of the market, cost Rs. 0.35 million.

### **Objectives:**

The analysis of the retail structure of the study area will give the clues about the needs and requirements for present and future. This rationale study has been launched:

- To compile a comprehensive and detailed computerized database containing information about the planned neighborhood of Clifton
- To note down the existing land use and to find out the physical changes occurred by the people of the area
- To provide a basic frame work for a continuous mapping and further to make a through investigation of the commercial land use in the study area
- To pinpoint the consumers preferences

### **Methodology**

To achieve the objectives of the study, the quantitative and qualitative data were obtained from primary sources based on intensive field survey, general observations questionnaire and personally conducted interviews of the people visiting these shopping centers. Finally the collected data were analyzed and presented in the form of maps, tables and cartographic models by using GIS and computer assisted cartographic techniques. GIS offers an innovative technique that helps to create, visualize and analyze information and data in a better way. In recent years advances in computer and GIS technologies have made possible new automatic approach to spatial analyses (Taylor, 1991).

Since the study area performs a variety of functions hence it is necessary to summarize it. Tabulation was done in order to do the functional classification of land-use within the area. The general categories include: commercial functions, residential areas, vacant land, open spaces, institutional buildings etc.

The questionnaire survey was taken to investigate the consumer behavior for particular goods and services from different business centers. Shopping preferences of consumers have been shown with the help of desire lines-straight lines drawn between the consumer residence to the shopping centers to indicate the consumer behavior and shopping habits.

### **Discussion**

Karachi Development Authority's town expansion scheme no. 5 at Clifton is a bold step towards extension of a metropolitan Karachi to the waterfront (Azad and Mahmood, 2003). In October 1964, the government of Sindh sanctioned the scheme covering an area of 1950 acres (KDA, 1968). It is a high-income residential area having some squatter settlements. It forms part of Sadder Town of district South having a population of 71,778 (Census, 1998). This scheme consists of nine blocks (Fig. 1). Being close to the sea, the height of land, which the neighborhood occupies, generally varies between 60 feet to 100 feet above sea level. The most famous landmark of Clifton, Abdullah Shah Ghazi Tomb is 97 feet high. Clifton provides recreational facilities to Karachities. Once it had the amusment park called Fun Land, which is now replaced by a huge park Bagh-e-Ibne Qasim. Near this park, a water-jet fountain is constructed which is the world latest, rising to a height of 620 feet. It is the world's second highest after the Jeddah fountain.

In Clifton, the proportion of commercial land has also increased from 0.3% in 1985 to 18.3% in 2002, which shows 18.1% increase. During the same period there has been a decrease in the proportion of residential land from 45.3% to 39.5% (Table 1) (Figs 2 and 3).

Up to 1985, the space on the coast was lying vacant. Uzma Arcade and a few others were the only mentionable commercial centers in Clifton. However, by 2002 an extensive area had been taken over by commercial establishments. As the map shows commercial activity had proliferated in all directions along major roads (Khayaban) of Clifton including Khayaban-e-

**Table 1:** Clifton: Land use change 1985-2002

<b>Land use</b>	<b>1985 % share</b>	<b>2002 % share</b>	<b>1985-2002 % change</b>
Commercial	0.3	18.3	18.1
Education	1.5	1.2	-0.3
Health	0.8	0.8	0.0
Open Space	12.3	3.7	-8.7
Public Building	4.3	2.2	-2.1
Recreation	35.1	34.1	-1.0
Religious	0.4	0.2	-0.2
Residential	45.3	39.5	-5.8

Source: Based on field work conducted in 2002

**Table 2:** Clifton: Basic business information

<b>Block</b>	<b>No. of functions</b>	<b>No. of Establishments</b>	<b>No. of workers</b>	<b>Floor covered area (sq. feet)</b>
1	66	1109	1727	111663
2	52	661	684	96860
3	20	100	183	15710
4	82	730	1287	87726
5	78	754	3581	549650
6	6	15	13	2975
7	65	563	2260	204864
8	79	1017	2757	213633
9	48	291	1053	158798
<b>Total</b>		<b>5240</b>	<b>13545</b>	<b>1441879</b>

Source: Based on field work conducted in 2002

Iqbal, Khayaban-e-Roomi and Jami. The more noteworthy extension of commercial function has occurred along Khayaban-e-Roomi and in the coastal strip south of Shahrah-e-Ghalib (Azad, 2004).

In 2002, Clifton had 5240 establishments of 82 different kinds employing 13545 persons (Table 2). The shopping centers, along Khayaban-e-Iqbal and Khayaban-e-Roomi account for more than 80 per cent of all the commercial stores of the neighborhood.

It has been observed that many shopping centers and malls, located in Clifton are multistoried structures where business offices; offices of lawyers and medical services usually occupy upper floors of major shopping centers. In 2006, Clifton had a maximum of 3428 stores occupying 774525 sq. ft. space (53.7%) with more than 7564 workers at ground floors.

The relative importance of different functions has been investigated by detailed study of the area. The neighborhood is dominated by private offices (433), ladies tailors (218), food places (193), estate agency (106), ladies garments (103), and ladies cloth (99) (Table 3).

Of the various categories of functions that characterize Clifton business center, retail functions account for 52% while business services and personal services account for 7%

**Table 3:** Clifton: Dominant functions

Function	No. of establishments	Rank	No. of workers	Floor covered area (sq. feet)
Offices	433	1	3253	314850
Ladies tailor	218	2	570	15530
Food places	193	3	1147	96645
Estate agency	106	4	404	23837
Ladies garments	103	5	331	28011
Ladies cloth	99	6	238	13513
Jewellers	97	7	218	7606
General store	88	8	256	30405
Computer	79	9	266	22436
Clinics	74	10	328	24723

Source: Based on field work conducted in 2002

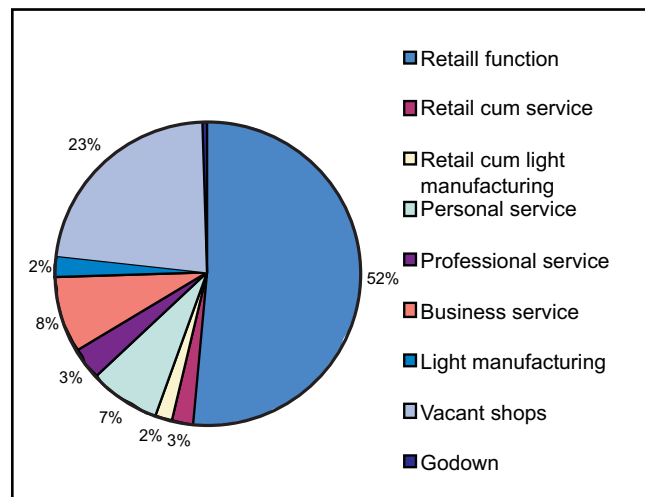


Figure 4

and 8% respectively (Figure 4). There are a large proportion of vacant shops in the study areas. Majority of these vacant stores (25%) are located in the newly constructed shopping centers.

Shopping is not merely the acquisition of things, it is the buying of identity. This is true of all cultures where shopping takes place and the consumption even of necessities in situations where there is some choice, reflects decisions about self, taste, images of the body and social distinctions. Shopping, although of course men also do it, is largely regarded as a female preserve, both shopping for daily necessities and for major consumer objects such as cars (Clammer, 1992).

Besides shopping, shopping malls are also adding to the beauty of the city. People also visit malls by travelling distance across the city to buy and eat at the place. Now, Clifton has become a regional shopping center, dotted with numerous shopping malls that has been

designed on most modern lines coping American and Middle Eastern shopping malls. Park Tower, The Forum, Aashiana, Gulf Way Shopping Mall, Cliff Shopping Mall, Lavish Shopping Mall and Continental Trade and Shopping Mall (Fig. 5).

The Park Tower houses some of the selected few franchises of transnational origin, specializing in food and drink. Besides, local businesses have also opened up at Park Towers which seems to be doing fine in the spheres of clothing and fashion. Apart from its modern architectural design, the mall provides an entertainment to shoppers.

Prior to new shopping centers the area of Old Clifton was without any such giant commercial project. The nearest place to shop was the market located on the Schon Circle in block 8. The markets located on the Schon Circle, Agha's Supermarket and Paradise Store are perhaps the oldest department stores offering each and every type of item ranging from household to ties, dress and formal wears. The Uzma Arcade which was once considered as the latest place to shop has lost its charm as new huge shopping centers have sprung up in the locality. Among the new shopping malls sprung up, The Forum and Aayshiana located along Khayaban-e-Jami inbetween Schon circle and Sub Marine Crossing attract a large number of customers.

Gulf Way Shopping Center located at the corner of Teen Talwar traffic intersection is also a relatively new development. It is a commercial cum residential complex but construction of the upper residential apartments is stalled due to stay order. However shops at ground level are doing thriving business, which specially deal items of women's interests such as unstitched clothes, jewellery and shoes (Hassan, 2000).

The arterial development of commercial activity of Khayaban-e-Iqbal and Khayaban-e-Jami is undoubtedly a shopper's paradise. Blocks 5 to 9 constitute the most upmarket portions of Clifton, and perhaps of the entire city. Bustling with activity, number of purpose built malls and shopping plazas, this area has seen a great deal of real estate development. With several popular restaurants, art galleries, computer hardware and software markets and other entertainment options, this area has something for just about everyone (Andrew, 2006).

Sasi Arcade in Block 7 has a wide variety of computer and electronic equipments. Clifton center in Block 5 also has a well-stocked computer hardware market. Behind Clifton center is a long line of CDs and DVDs in Karachi. Among those the best known are Laraib and Sound of Music.

Besides shopping activity there is also a number of eating out options, ranging from the ultra sophisticated Clifton Grill, Café Flo, found on the grounds of the Alliance Francaise in Block 8, to the open air stalls that line the Boat Basin food street (Sea Breeze Center Food Street). Block 5 is also home to one of the area's oldest restaurants, Maxim's, popular for its steaks. But by far the most famous restaurant in the area is Bar-B-Que Tonight in Block 5.

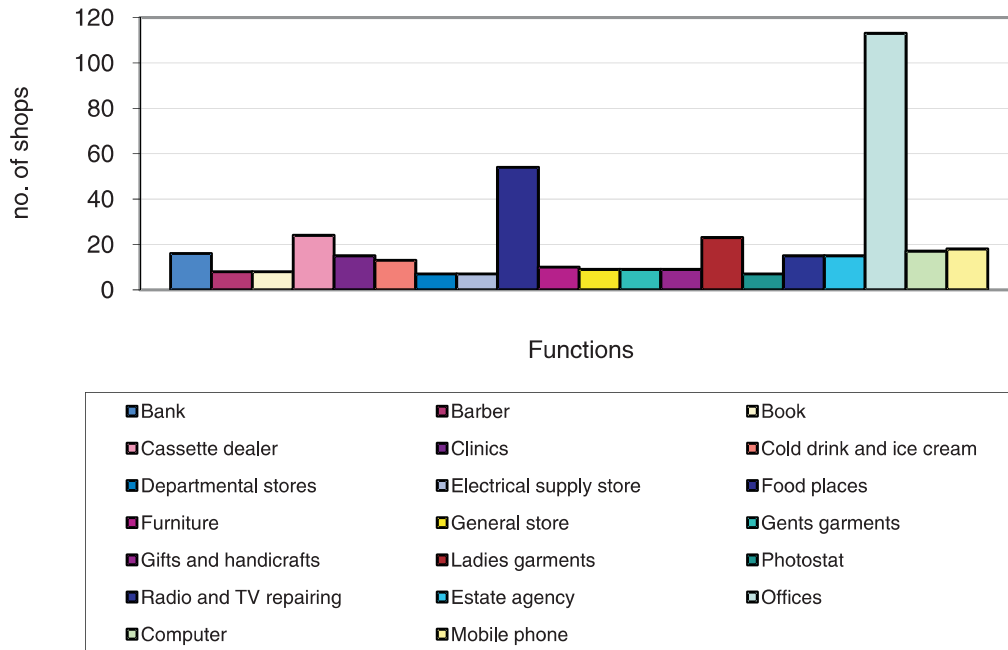
### **Spatial pattern of commercial structure**

Among nine blocks of Clifton, Block 5 and 8 have been selected to highlight the spatial pattern of commercial centers. Block 5 is the most expensive area of Clifton having high land values of residential and commercial. The area is highly built up, well organized and planned. It is engulfed by Shahrah-e Iran, Khayban-e-Saadi, Shahrah-e-Firdousi and Khayaban-e-Roomi. Nahar-e-Khayam passing through this block is not properly maintained.

Block 5 has two huge shopping malls Park Towers and Clifton Center which not only serve as shopping purpose but also for recreational purpose, as they have a number of food places, play lands etc. The principal retail functions of Block 5 are shown by figure 6.

Park Towers is the main attraction of Clifton Block 5 (Fig 7). It comprises three floors having a number of shops of branded items. Park tower is designed in such a way that the vertical movement of pedestrian traffic is exposed to shop displays on all floors. It is also equipped with glass-capsule elevator. There are total 101 shops of different functions dominating

**Fig. 6: Dominant Retail functions Block 5**



ladies garments (16 shops), gifts and handicrafts shops (9 shops), ladies and gents' shoes and jeweler (5 shops).

**Block 8** is the main and oldest commercial area of Clifton. The arterial commercial development can be seen along Khayaban-e-Iqbal from Teen Talwar to Schon Circle. They perform a variety of retail functions such as ready made garments, jewellery, ladies and gents cloth, ladies tailors / embroidery shops and shoes stores etc. (Fig. 8). Gulf Way Shopping Mall, Cliff Shopping Center, Clifton Pride, Continental Trade Shopping Mall, Metro Shopping Mall, Uzma Arcade and Dewan Arcade are the focal points of commercial activity in Block 8. Figs. 9 and 10 depict the internal structure and retailing trends of these shopping centers.

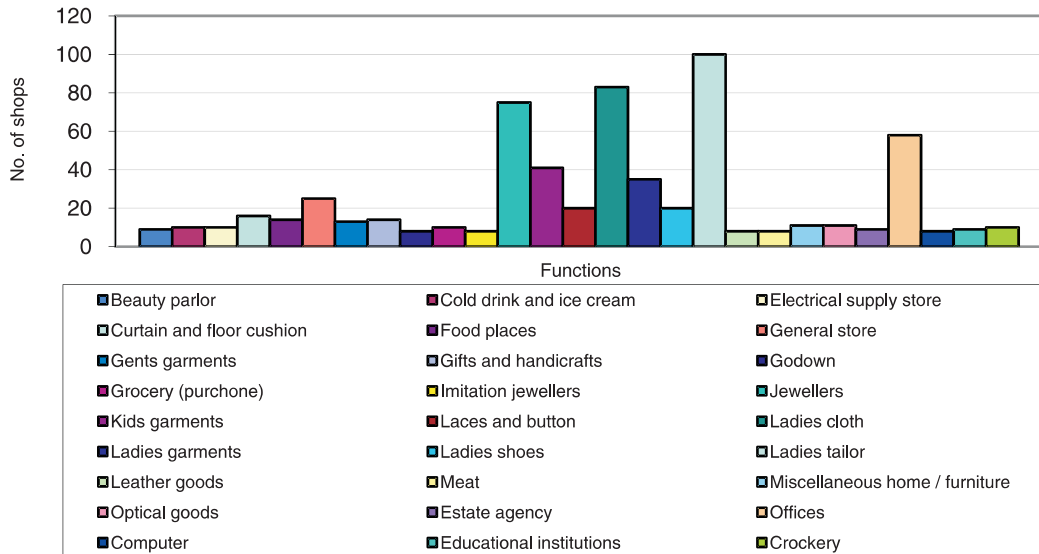
The Uzma Arcade, which till recently was an important shopping center of Clifton has lost its primacy as new shopping malls offering greater variety of articles like The Forum, Park Tower and The Gulf Way Shopping Mall have emerged during the past one decade.

**Consumer Behavior:**

The high-level metropolitan business centers of Clifton offer facilities of a specialized functional area to a large region. Figure 11 provides a clear picture of shopping preferences for specific items such as shoes, garments, and food. Clifton performs a leading role in the case of garments and shoes. Food places have emerged near Boating Basin along Khayaban-e-Romi in Clifton, which has become a specialized functional area of the eating places of Clifton. The trend of Bar B. Q. boosts up this area at this attractive recreational site in the evening.

The analysis of the shopping preferences to choose the business centers has depicted that more mobile, better-off consumers residing in various societies near Shahrah-e-Faisal, Defence, Gulshan-e-Iqbal, North Nazimabad etc. often prefer to travel to a longer distance.

**Fig. 8: Dominant Retail functions Block 8**



However they acquire goods and services to avoid the concentration of the retail trade, which generate more traffic and consequently more population.

### Conclusion

This study represents the first serious attempt to identify the nature and spatial pattern of commercial functions in the planned neighborhood of Clifton. A dramatic change has been occurred in commercial and residential land use between the years 1985 to 2006. The percentage of commercial area has been increased from 0.3% to 18.3% (18.0% change) where as the land occupied by residential purpose has been decreased from 45.3% to 39.5% (5.8% change).

In accordance with Berry's classification of hierarchy of centers, Clifton fulfills the requirements of regional shopping centers. Numerous new shopping centers and malls have been designed on the most modern lines. Some of the commercial centers are planned shopping centers such as Uzma Arcade and Clifton Pride as provided in the original plane. However majority of them are unplanned shopping malls like The Forum, Park Tower and Gulf Way. The retail trend of Clifton can be observed through ladies and kids garments, shoes and artificial jewellery. There are also some branded outlets located in the study area. Food places and food courts have been emerged along Khayaban-e-Romi, Sadi and Sahil as well as in various shopping malls in Clifton, which has become a specialized functional area of the area.

The emergence of these mega shopping centers in Clifton represents a trend towards decentralization or diffusion of the central business district of Karachi on the same pattern as observed in American cities. It is interesting to note that during all these years Karachi's CBD, if there is any such thing, has failed to develop such shopping malls or centers, though the extensive Saddar area has a number of specialized markets (cloth, jewellery, electronic goods, readymade garments and others) consisting of relatively small sized stores usually occupying the ground floor of three or four storied buildings.

Parking lots are conspicuous by their absence in many business centers. The only space available for parking of cars and motorcycles is in the form of off-street parking, creating

traffic problems particularly at the morning and afternoon peak hours.

It is worth noted that huge commercial complex; Dolman City has been introduced along the coast at the place of former casino having shopping mall, hotel and apartments. But it is still in the process of construction for a long time. Recently another such big project; Sofitel Tower has been launched at Khayaban-e-Iqbal between Schon Circle and Do Talwar. It has mall, hotel and gold and wedding souks. It is expected that with the completion of these giant projects retail structure of Clifton will be further improved.

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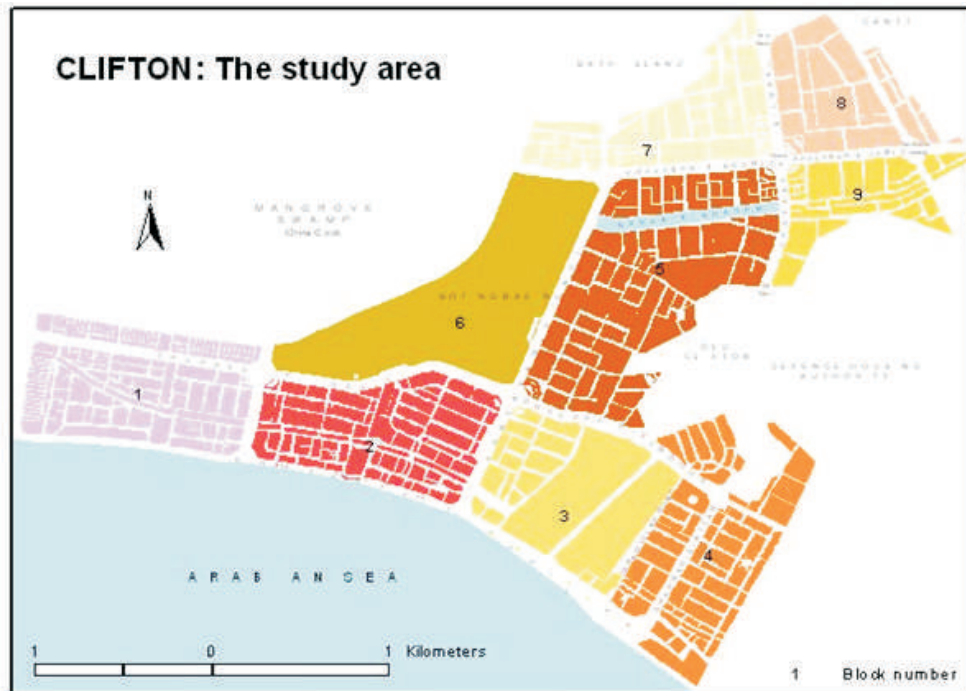
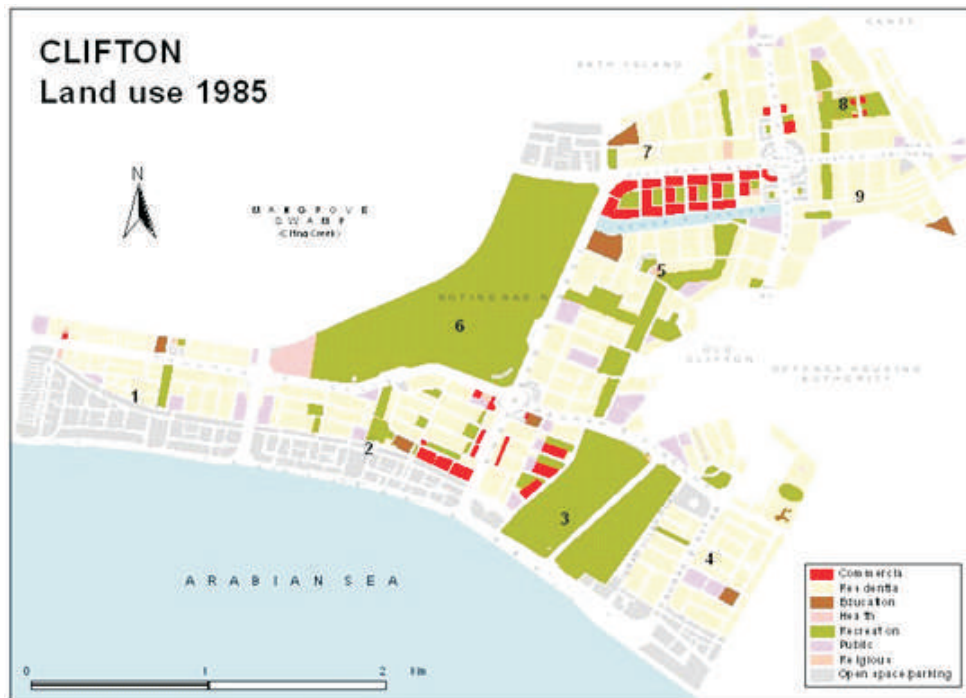


Fig-1



Source: KDA 1985

Fig-2



Source: Based on field survey - 2002

Fig-3

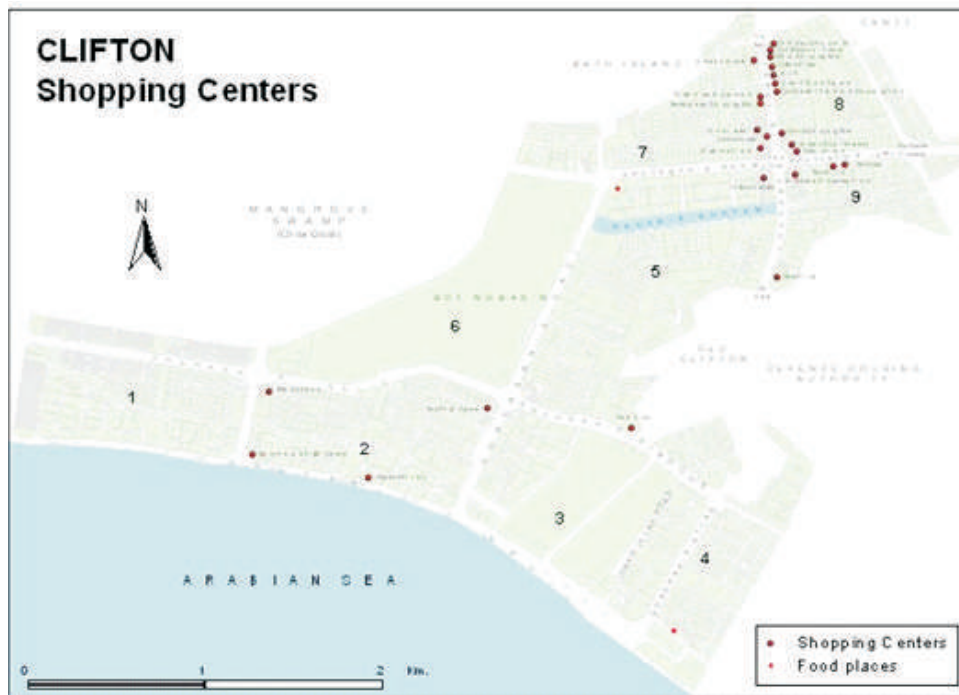


Fig-5

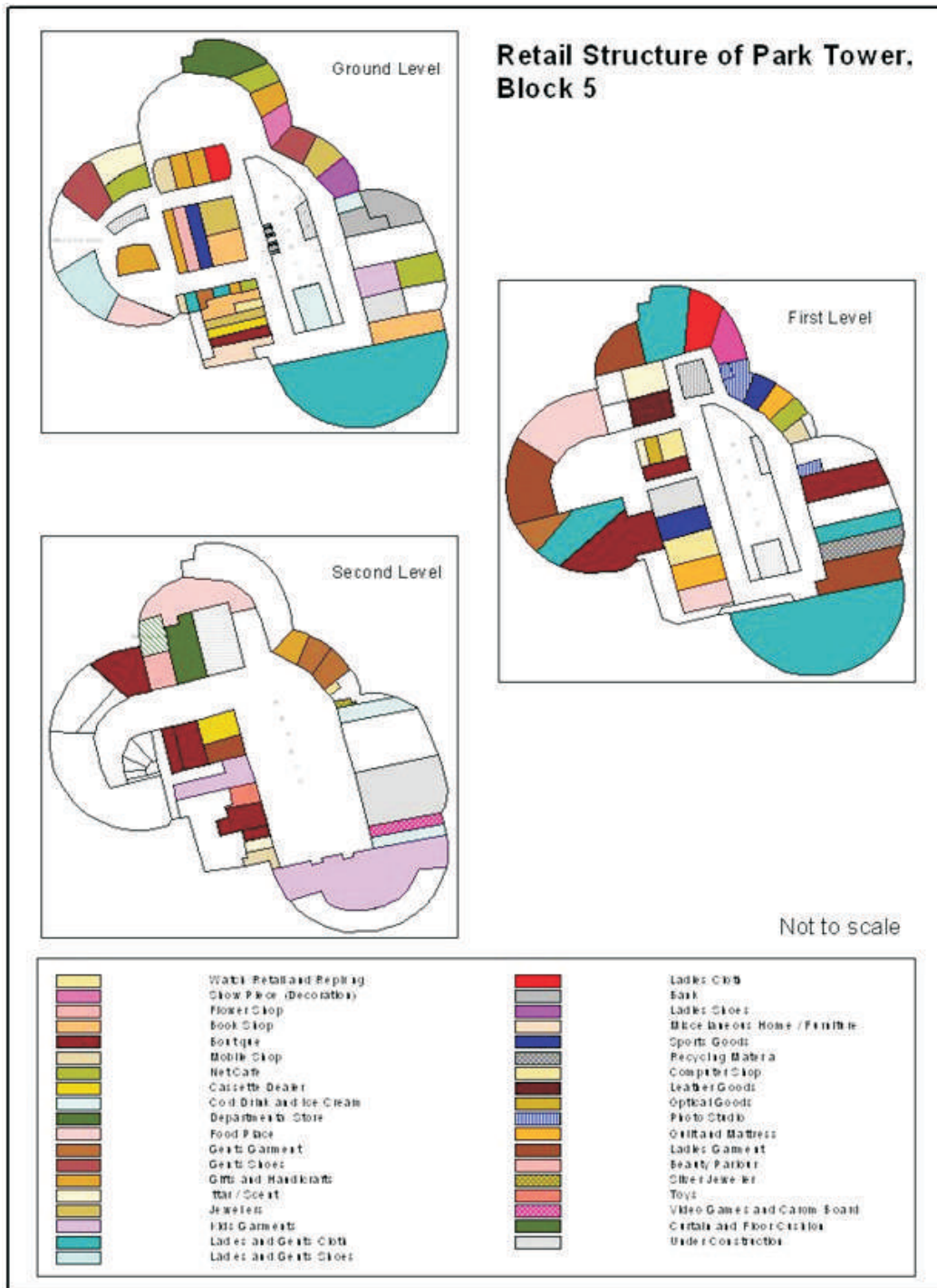


Fig-7

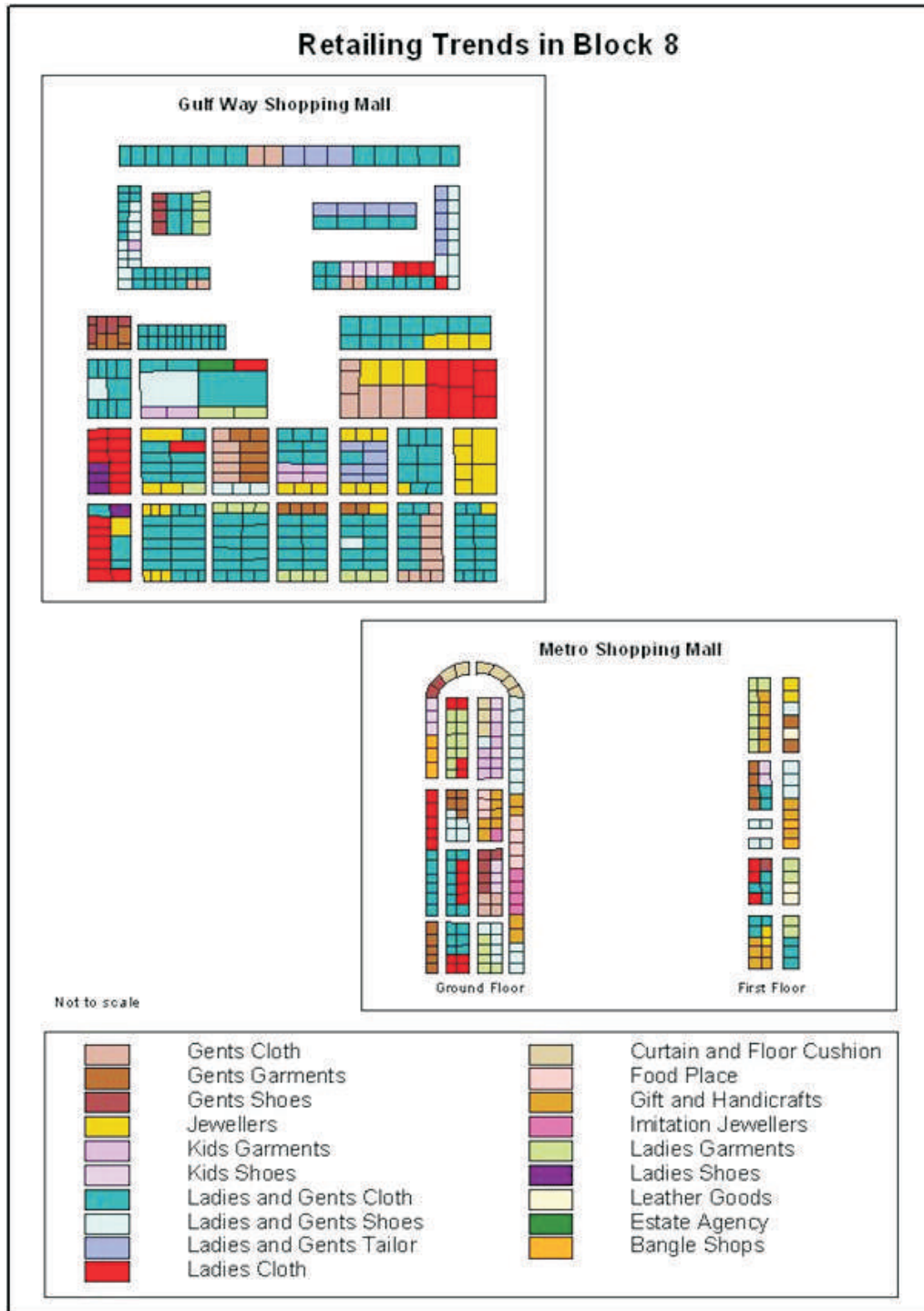


Fig-9

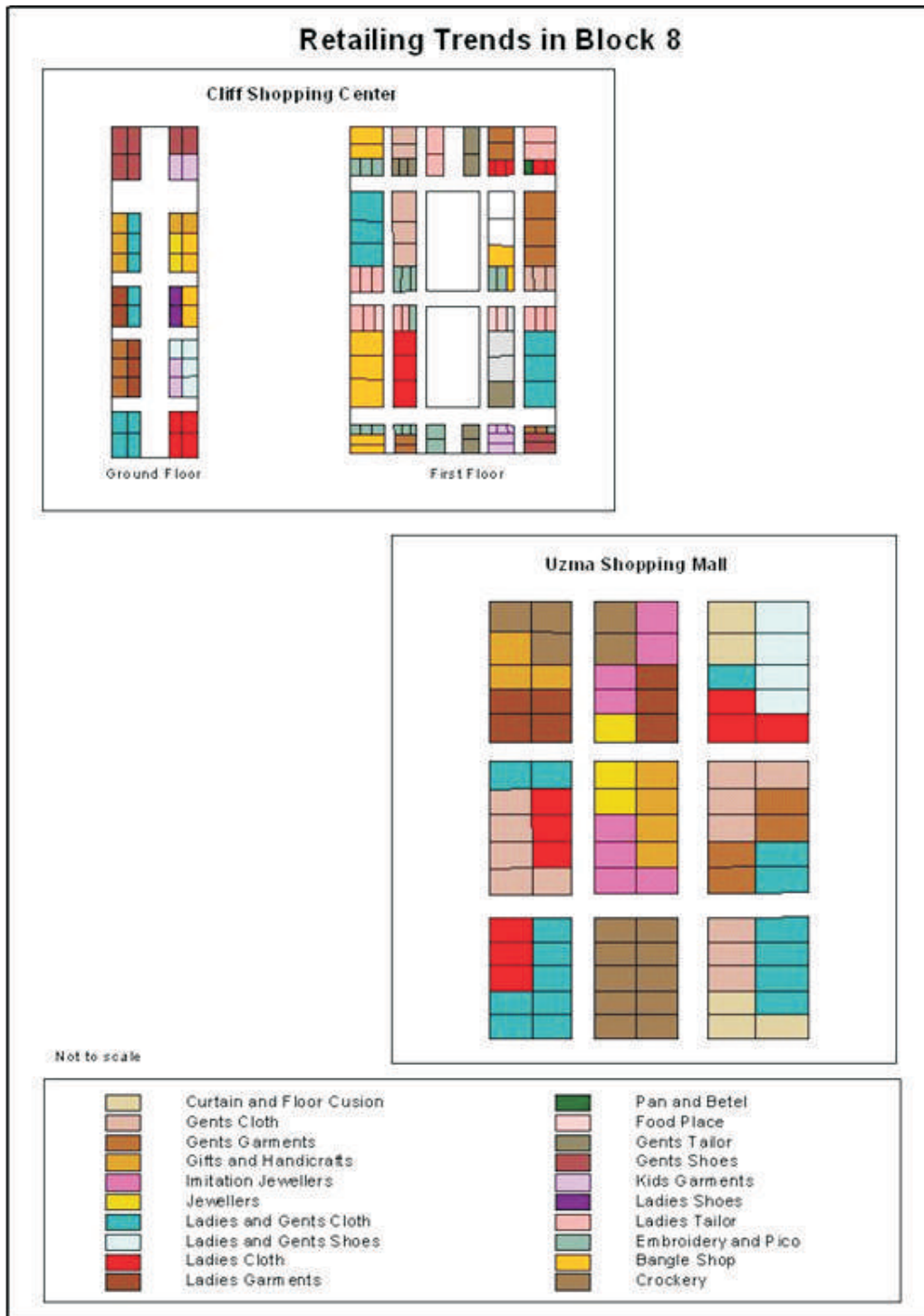


Fig-10



Fig-11

## **Process of Development and Future Prospects: A Geographical Analysis of Balochistan Province**

RAZZAQ AHMED\* AND KHALIDA MAHMOOD\*\*

\*Department of Geography, Federal Urdu University of Arts, Sciences and Technologies, Gulshan Campus, Karachi. \*\*Department of Geography, University of Karachi.

### **ABSTRACT**

This paper seeks to investigate the patterns of development and future prospects of Balochistan province. It is the largest of Pakistan in terms of area but is considered as relatively underdeveloped province of Pakistan. It is also observed that the extreme variation occurs in the development pattern among the districts of the province. Quetta, which dominates economic activity in the province, is the most highly developed district of Balochistan and the rest of the province being essentially rural and relatively underdeveloped, except for a few pockets of development in districts like Lasbela and Gwadar. The exercise will facilitate policy makers in allocating development resources in districts where the deficiencies are evidently serious.

In order to assess the development potential of Balochistan with its tremendous resources, it is necessary to measure the past and present development pattern of districts. Data for 1981 and 1998 have been chosen for this purpose. The results clearly show an increase and improvement of development process in a number of districts of Balochistan. Present study encompasses both development pattern and potential resources of Balochistan for future development.

### **Introduction**

This paper seeks to examine the characteristic patterns and potential of development in Balochistan. The extent of development that has been achieved by various districts of the province presents an extra ordinary pattern of disparity. The examination of this disparity calls for a change of policy towards development in this province. The pattern of development in this province is so uneven that some districts represent a high concentration of a number of economic, social and political activities while a number of districts are generally seen as relatively backward with lack of these activities.

The province of Balochistan is considered as relatively underdeveloped province of Pakistan but variation occurs in the level of development of various districts of this province. This backwardness must have several reasons behind, such as the lack of financial allocation, politico-administrative turmoil or inaccurate planning and utilization of resources. The study focuses on the various districts of the entire province of Balochistan including Quetta, the provincial capital, which is the hub of economic activities in Balochistan.

Examination of such areas with uneven level of development is important and attracts attention of planners and decision-makers. There is no conscious effort towards systematic organization of such research in geography structured on levels of development in Balochistan. In the past socio-economic data was used to measure the quality of districts (Zaidi 1966, Mahmood 1990, Pasha et al, 1990, Jamal 2001, Jamal et al 2003, Mahmood 2003). Such work on micro-geographic scale follows the tradition of Zaidi 1961 and Whitney 1970.

### **Study Area**

Balochistan lies between 24 53' and 32 05' north latitudes and 60 52' and 72 18' east longitudes. It is the largest province of Pakistan in terms of area, covering 347,190 sq. km. Balochistan is located in the southwestern corner of Pakistan, occupying about 44% of the total area and 5% of the country's population. The average population density is hardly 20 persons per square km (Census, 1998). Pakistan's land border with Iran falls completely

within Balochistan. Together with NWFP it also shares Pakistan's border with Afghanistan. Its coastline is about 750 km along Arabian Sea with a number of peninsulas. The coastal area is not effectively connected with the interior of Balochistan. The capital of Balochistan is Quetta. It is made up of six administrative divisions, 26 districts (Figure 1) and 60 tehsils in 1998. The boundary has witnessed a number of changes in Balochistan since 1947.

The geographical location gives Balochistan a unique geo-political significance, which has been further augmented by the need and interest of the landlocked Central Asian States for an opening and shortest access to the warm sea. Its proximity with Central Asian Republics enhances its strategic position (Ahmed, 1992). The Makran coast lies opposite to the Straits of Hormuz, which is an important route of the oil tankers bound for Japan and the Western countries to the Persian Gulf. The Coastal Highway for Makran and the Gwader Deep Seaport project are Pakistan's response to these imperatives of regional political-economy of South Central Asia (Dawn, 2005).

Balochistan is a land of contrasts. Bare, barren and rugged mountains hedge in green valleys dotted with bountiful orchards. Vast deserts give way to fertile oases and immense coastline filled with marine life and mangroves. The altitude also ranges widely from sea level to the Khilafat peak (11,440 feet above sea level), in Harnai valley of district Ziarat.

Balochistan is a water-starved and land-rich region in Pakistan. Agriculture has a major share in the economy of the province but limited rainfall and availability of water restricts the cultivated area. Approximately 11.77 million acres of land in the province is still lying barren and uncultivated. Balochistan has a cropped area of 21,00,000 hectare, which is just six percent of the whole area of the province. Twenty five percent of this cropped area gets water from permanent supplies like canal, karez etc. Around 60% of total cultivated area is under dry land agriculture production system. The two prevailing systems of agriculture in Balochistan are "Khushkaba" the rain fed and "Sailaba" the flood irrigated.

Balochistan has two types of irrigation system; Indus gravity-fed canal system and small scale irrigation that annually irrigate 230,000 hectares and 320,000 hectares area respectively. The sub soil water is also widely used for agriculture through the underground water channel locally called Karez. This is one of the oldest irrigation systems in Balochistan. Except Nasirabad and Jaffarabad, there is no perennial system of irrigation in the province. These districts receive water from the tail end of the Indus River System (Haider, 2007). However these days tube wells have become more common. Tube-wells are mostly used for growing fruits and vegetables and to supplement other sources of irrigation. In recent years, a number of small dams have been constructed for irrigation. The prominent reservoirs are bund Khushdil Khan in Pishin district, Hanna Lake in Quetta and few reservoirs in Makran.

Balochistan is highly suitable land for cultivation of fruit and growth of horticulture. The province produces millions of tons of fruits annually. Balochistan is rightly considered as a fruit basket of Pakistan. It contributes country's 90% production of grapes, cherry and almonds, 60% of peach, pomegranate, apricot and 34% of apple and 70% of dates. The northern hilly districts such as Kalat, Quetta, Pishin, Killa Saifullah, Killa Abdullah, Ziarat, Loralai, Zhob and the southern area comprising Kech and Lasbela districts are the major fruits growing areas. Chilghoza (*pinus garadiana*) is found between 9,000 to 11,000 feet in the area of Suleiman ranges comprising the northeastern part of the province. Shin Ghar, Kaisa Ghar, Tor Ghar ranges of Zhob district are the major producers of chilghoza (pine nut) in Pakistan.

Balochistan's economy is basically a pastoral economy. The province is rich in livestock resources, which contributes about 40% of Pakistan's total livestock population. It provides approximately 90% of its total area for livestock rising and generates more than 20% of provincial income. It has been estimated that about 80% of the provincial population is directly or indirectly involved in livestock business. Due to prolonged drought, grazing



rangelands have deteriorated and hence the number and productivity of livestock has decreased considerably (Haque, 2007).

Balochistan has 90% share in annual marble export. The province is rich in marble deposits. Marble is found in a number of localities in Lasbela, Khuzdar, and Chagai districts of the province. Onyx marble is being mined since 1950's in Chagai district (Haider, 2007).

### **Methodology**

In order to measure the level of development and to identify inequalities in the province of Balochistan, Principal Component Analysis has been employed using seventeen indicators for 16 districts of 1981 and 26 districts of 1998. For 1981 the analysis was done on all Pakistan bases.

These indicators include urban population, literacy, primary and secondary enrollment, immigrant, non-agricultural labour force, employment in manufacturing, banks, manufacturing value added per capita, doctors, roads, voters, population potential, shape of districts, owners farms, cultivated land and value of cash crops per capita rural population. The data were derived from diverse sources like various censuses of population, manufacturing and agriculture and other government publications. The districts are as those of population census of 1981 and 1998.

Principal Component Analysis produces components in descending order of their importance, that is, the first component explains the maximum amount of variation in the data and the last component, the minimum (Rogerson 2001). In this study four components emerge from the analysis, which collectively explain total variation in the data (Daultrey 1976).

### **Development Potential in Balochistan**

Having a vast territorial extent Balochistan has been endowed with variety of resources. The possibility of utilization of a number of unexploited resources of Balochistan in future gives rise to hope for better economic prospects. Balochistan possesses great potential for economic development but a number of resources remain to be exploited.

Geographically, the province is located at an easy access to the other three provinces of Pakistan and has very long borders with Afghanistan and Iran. Its proximity with Central Asian Republics enhances its strategic position. Balochistan is located in a region of immense geo-political importance. It is situated at crossroad of South Asia, Central Asia and Middle East. The areas like Afghanistan, Iran and Arabian Sea surround it. It is very close to the mouth of Persian Gulf, which is rich in oil and gas reserves. It is also located on the most important international sea routes and hence the prospects to become the center of international trade.

The Makran coast, from the Iranian border to Hub river estuary, constitutes the southern limits of the province. The coastline is well provided by a host of natural ports like Jiwani, Gwader, Pasni, Ormara and Gadani. This coastal tract provides another route into South Asian Sub-continent connecting the Lower Indus Plain with Southern Iran. With the recent opening of Gwader Deep Sea Port and development of Ormara as a navel base, this coast is experiencing considerable shipping activity. The prospects of revival of ship breaking industry at Gadani cannot be ruled out which was the world's largest ship breaking center only sometimes back.

The province has long suffered mainly due to the remoteness resulting from poor communication and transportation infrastructure (SPDC, 2001). Now that greater attention is being given to road and highways construction and reduction in the remoteness is expected. Improvement in transportation will certainly enhance the accessibility of a number of districts located in the far-flung areas of the province. This will go a long way towards

boosting agricultural activity especially fruit cultivation. Fruits from various districts of Balochistan are supplied on a large scale to all parts of the country as well as exported other countries. The date production of 103 varieties in Makran may earn a large foreign exchange for the country by exports. The apples produced in Balochistan, are popular all over the world for their peculiar taste, superb quality and a good variety.

Fruit yield can be increased through use of modern orchid management practices, including improved moisture conservation, fertilizer application and proper farmer's training (Khan et al, 2007). Domestic fruits are transported throughout the country in un-refrigerated trucks over poor roads. It takes 1-3 days from Quetta to Lahore and Karachi. Trucks are often overloaded. In combination with poor quality packing materials, overloading damages the fruit during transportation. It produces a lot of fruit wastage and reduces the quality of fruits. This problem needs special attention.

The province has a considerable agrarian potential. Kachhi-Sibi plain (Sibi, Bolan, Nasirabad, Jaffarabad, Jhal Magsi) and Lasbela plain are the main agricultural regions of the Balochistan. The province is not self-sufficient in food. At present only 4.6% of the total land area of Balochistan is cultivated. The culturable waste (14 % of the total area) must be brought under cultivation through water resource development. The shortage of water can be solved through, for example, diversion and extension of canals from right bank of river Indus not only to peripheral areas along Sindh border but further into the areas such as Sibi, Dhadar and Gandava. The small streams in the Kachhi-Sibi plain can be dammed to ensure water supply. Rice growing areas of Balochistan have further potential for growth of both area and production if water availability is further improved and assured. The patches of land in the mountainous areas like Ziarat, Harnai, Kohlu and Kalat can provide off-season vegetables in Kharif season on a large scale. Tomato, potato, onion, cauliflower, chili and cantaloupe are exported to the whole country. This potential of the province can be enhanced by proper planning and decision-making. Recently cotton and other oilseed crops have also been introduced quite successfully in the districts of Sibi and Bolan.

Since agriculture is the mainstay of the people of Balochistan. Its development is linked to the development of water resources. The groundwater resources are on decline (even in 1 meter per year in some places such Pishin-Lora), due to mismanagement of water resources. There are about 73 small or large rivers and streams constituting the three basin of the province; Nari, Khara and Coastal Makran. Through most of them are seasonal and flow intermittently during rainy seasons. Only 30 per cent of this potential of rivers and streams is utilized through different schemes. A comprehensive investigation of all the basins is needed. Besides streams, other sources are also at the risk of over exploitation (Haider, 2007). There is also a need to exploit agricultural potential of Chagai, where vast desert land can be brought under cultivation through the development of huge groundwater resources (Ahmed, 2005).

Modern irrigation methods such as drip and sprinkle are more beneficial especially for orchards in the areas like Balochistan, where fields are uneven, water is scarce and expensive and evapotranspiration and runoff is high. These methods improve irrigation uniformity, ensure precise application of nutrients and facilitate operation of agriculture equipments because rows are dried enough and allow timely application of herbicides, insecticides and fungicides (Hassan, 2007).

The province has great potential to develop its vast coastal areas and rangelands to increase the overall agricultural productivity. Under the proposed plan, agricultural research facilities will be upgraded especially in the field of horticulture and livestock. The up-scaled research facilities will be helpful in improving agriculture development and achieving self-reliance in agricultural commodities (Haque, 2007). The 750 km long Makran Coast, with 200 nautical mile wide exclusive economic zone (EEZ) has very good prospects for fishing. In future a

proper fish harbor could have been planned at Pasni and develop it as a major fishery and seafood outlet of Balochistan. Currently, Balochistan has been confined to merely on-shore water fishing due to lack of infrastructure facilities.

Balochistan produces more than 40% of the primary energy of the country in the form of natural gas, coal and electricity. Geological surveys have reported reserves of 19 trillion cubic feet of gas and 6 trillion barrels of oil during offshore exploration in Balochistan. Planning and Development department reported only 500 million cubic feet of gas production per day from Sui Gas fields in Dera Bugti in 1998. Reports confirm huge reservoir of petroleum and gas in Kalat, Kharan, Kohlu and Lasbela districts of Balochistan.

The province also has a good potential for utilizing wind power and solar energy. The Makran coastal belt and the Chagai district are the most suitable areas for wind energy, having wind speed more than 8 mph (9.6 knots) above 15 to 20 feet from the ground level (Khan, 1993). So by using this renewable resource of energy the adequate shortage of power in the province and country could be reduced.

Balochistan is also blessed with extensive mineral resources. Its great mineral treasure is yet to be tapped. A large number of metallic and non-metallic minerals occur in Balochistan, but among metallic minerals only chromite is being mined since 1930. Among non-metallic minerals in-exhaustive reserves of limestone occur in Balochistan. Other mineral deposits include barite, fluorite, gypsum/anhydrite, limestone/dolomite, magnesite, marble and sulphur. The estimated reserves of all coalfields are 196 million tones. Balochistan has considerable potential for copper mining as a number of prospects have already been identified, including the Saindak deposit in Chagai. The total estimated iron ore reserves are about 273 million tones in Balochistan. Whereas zinc, lead and manganese ores have been found in various localities of Lasbela and Khuzdar districts.

Marble is another non-metallic mineral found in large varieties in the number of places of Balochistan. The province has 50% share of marble production in the country. Out of the total production of around 1 million tons monthly, 0.3 million tons is daily shipped from Karachi to nearly 52 countries of the world (Haider, 2007). The marble industry in the province has a number of problems such as small number of processing units, lack of technical facilities, undeveloped and unsecured marble quarries, lack of sewerage system, shortage of water, poor infrastructure including road network and electric supply and above all deteriorating law and order. This sector must have modern production facilities at their disposal and produce a diversified range of end products both in standard as well as in special dimension formats. There is a need to monitor the international market and changing trends in demand and supply. To utilize the local raw material government has planned six Export Processing Zones at Hub, Gadani, Turbat, Gwader, Pasni and Quetta (Dawn, 2002).

Balochistan enjoys biodiversity due to its vast latitudinal extent. It is rich in environmental resources. The juniper forest of Ziarat covering an area of 125,200 acres, are rated as second largest juniper forest in the world. Balochistan has numerous tourism resources. By virtue of its natural treasures, captivating scenery, significant sites of multifold importance, variety of flora and fauna, diversity of climate and unique landscape, it possesses huge potential for development. Hill stations like Quetta, Ziarat, Muslim Bagh and Kanmahter Zai, Urak and Chutair valleys; gorges like Sandeman Tangi, Fern Tangi, as well as Hazarganji Chiltan National Park attract tourists both from the country and abroad. This potential can further be developed with improvement in facilities, proper planning and advertisement. The coastal area of Balochistan also possesses a good tourism potential, it can be developed as attractive tourist sites. The fascinating beaches of Gwader, Jabl-e-Zarin beach at Pasni, Daren beach at Jiwani and many other sites along coastal belt may be converted to an attractive tourist resorts (Haider, 2004). The historical site of Mehargarh has a rich cultural heritage. The rock paintings and stone engraving in caves in Suleiman Mountains and the

series of mud volcanoes (Chandergup, the famous one) along coast in Lasbela district can give way to international and domestic tourists. There is also an attractive opportunity available for rail safari along Sibi-Bostan-Zhob-Quetta route parallel to the obsolete old railway track (IUCN, 2007).

Balochistan is the least populated and the most backward province of Pakistan. It will take years to bring it at par with other province of the country. Balochistan is currently the center of attention of the decision-makers in Islamabad (Ali, 2005). Efforts are being made by Federal Government to develop the huge natural resources, new infrastructure and revamp of agriculture system in the province. It has started various development projects costing Rs. 120 billion during the last three years in Balochistan. At least six Mega foreign funded projects are in execution in the province besides a number of small development projects and schemes in different sectors (Mahmood, 2004). At present, the Kachhi canal, Mirani Dam, Gwadar Deep-sea Port, Makran Coastal Highway, Saindak Copper and Gold Project and Quetta Water Supply Scheme are the Mega projects in execution in the province, which will certainly open new doors to foreign investment and thus bringing prosperity to the people of Balochistan and improving the economic health of the whole province (Haider, 2004), (Figure 2).

Today, Pakistan's prosperity is linked with the economic development of Balochistan. If the government continues its greater emphasis on infrastructure development launching new projects and schemes. In case least attention is paid toward development of human resources, the process of development will serve no interest of the local people of the province. They will be unable to benefit from the economic activities going on in their province.

### **Patterns of Economic Development: An analysis of 1981 and 1998**

It is common observation that large spatial disparities exist, in terms of level of development in the province of Balochistan. Quetta serves as a highly developed district in the entire area as a means of enhancing the level of development in the province in terms of revenue and job opportunities as well as providing certain services and goods to the whole hinterland (Harris, 1954) and thus radiating chain reaction of growth and development in the rest of the province (Mahmood 1990, Pasha et al, 1990).

In order to obtain a spatial pattern and to rank the districts in terms of the level of development there was a need to combine the emerging component scores in the form of a composite score. To compute this composite score these individual component scores were added to obtain the Weighted Component Score (Mahmood, 2003). These Weighted Component Scores (WCS) have been used as index for ranking various districts of Balochistan on the basis of general characteristics of the variables.

The component score 1 of 1981, consists of urbanization, industrialization and modernization shows that Quetta is the only district, which has captured the impact of urbanization and industrialization while rest of the province presents a very dull picture of modern development (Figure 3). Component score 2 comprising education and development, shows Quetta has achieved the highest score again. Gwader stands out at intermediate position (Figure 4). Component score 3 shows the process of agricultural development. Sibi and Nasirabad scored 0 to 1, due to having agricultural potential and some irrigational facilities (Figure 5). Component score 4 emerged as showing compactness of shape. Kohlu shows the high level of compactness of shape and hence the highest score. Besides Kohlu, Sibi and Zhob have scored well that is 0 to 1 (Figure 6). The Weighted Component Score reflects that only Quetta has emerged high on this over all composite score (WSC), demonstrating that during 1980's it has been the nucleus of over all development process in the whole province (Mahmood, 2004), (Figure 7).

The results of 1998 analysis highlight the significance of development and modernization on component score 1. Apart from Quetta a number of other districts have also captured the impact of development and modernization process. Gwader shows very high magnitude of development due to new projects (Mahmood, 2003). Lasbela, Sibi, Chagai and Khuzdar have also scored high (Figure 8). Component score 2 indicates development process and education. Quetta, Ziarat and Kech have shown high levels. Especially in primary / secondary enrollment etc. Other districts with better level of development on this component are Sibi, Pishin, Gwader, Mastung, Loralai, Barkhan, Chagai and Panjgur (Figure 9). Component score 3 reflects rural sector developments. All areas of Balochistan show very poor development in rural sector. No district could score high on this component (Figure 10). It is evident that rural sector needs attention of planners and policy makers. Component score 4 composed of differentiation of agricultural and industrial income. Lasbela has the highest score due to high manufacturing value added. Gwader, Kharan, Bolan, and Jhal Magsi show good level of agricultural income per capita rural population (Figure 11).

An analysis of the Weighted Component Scores shows that two pockets of development have emerged that is Quetta and Makran coastal area which includes Lasbela and Gwader, the districts contiguous to Karachi (Mahmood and Azad, 2003), (Figure 12). Quetta has secured top position, as the most developed district in the province. It is very clear that Quetta exhibits its importance as the administrative center of the province and the only highly developed district in Balochistan. This is a pocket of development in an under developed province. Intermediate level has been achieved by Makran coastal area that is Lasbela and Gwader districts. This is another patch of development, which has emerged in the southern part of the province. This implies that as Karachi stands out being the focus of industrial and commercial activities, it does serve as a catalyst of development to the neighboring district of Lasbela, where a secondary industrial area is located at Hub and tertiary manufacturing centers at Winder and Uthal. Output of these units not only meets the demand of the internal market but a part of it is also exported. Hub and Winder industrial estates have considerable potential for improvement in productivity if infrastructural facilities are enhanced.

The results clearly highlight the importance of physical and socio-economic infrastructure, which leads to improvements in quality of life (Mahmood and Azad, 2003). It gives a very encouraging picture of development potential in southern area of the province. But it also gives a very sad picture of backwardness, poor access to basic infrastructure and services like health, employment and poorly developed transport network in the interior of the province. The idea that provision of goods and services is more efficient and cost effective in cities and towns, like Quetta, Hub and Gwader. This explains the high degree of correlation between urbanization and development.

### **Conclusion and Suggestions**

The study reveals that Balochistan presents a clear picture of uneven development. Results of 1981 analysis show very limited pockets of development in Balochistan. The analysis for 1998 shows, that the development scenario has started changing in this province. Very significant development process has begun along the coastal districts of Lasbela and Gwader, which is a very positive sign.

The huge resources of this province and the great potential in terms of minerals, forest, fishery etc. can be significantly utilized to improve the pace of development in this province. Measures by the government towards industrial sector can certainly improve the local raw material-based industry in Balochistan. The province is rich in groundwater which is offering best projects.

The development of agriculture in Balochistan would stimulate, revive and strengthen not only the provincial economy but also the national economy. Nasirabad, Jaffarabad, Dera

Murad Jamali, Usta Mohammad, Lasbela and many areas of Central Balochistan are good agricultural regions of the province. At present, Balochistan is not self-sufficient in food. It is however contended that the province may become the food basket of Pakistan for its higher potential in agriculture. The cultivable waste in the province must be brought under cultivation through water resource development. A strategy for increasing the cultivated area and per unit production should be followed to tap efficiently the high agrarian potential of Balochistan. The vastness of area, different geographical features and terrain in Balochistan enhances the need for modern agriculture machinery specially bulldozers, tractors, threshers etc. for leveling the land and making it for agriculture use.

There is a need to exploit agriculture potential of Chagai through a comprehensive development program. There have been survey-reports revealing tremendous underground resources in many areas of Balochistan. A report on Chagai's groundwater resources prepared by French experts reveals that vast areas of about one hundred thousand acres of Chagai desert can be brought under cultivation through the huge underground resources of water in Chagai district. Being already rich in mineral resources, Chagai can be transformed to an agricultural district through a green revolution that can be brought about through development of its huge groundwater potential.

Government should encourage the small farmers by initiating an easy loan policy for them to be equipped with bulldozers and tractors so that acute problem of land leveling and land development in remote areas of the province could be resolved. The steps and measures must be taken for construction of farm to market roads, establishment of Agro-based industries, provision of storage and processing facilities for agro products and farm mechanization to bring green revolution in the province.

There is a dire need for a comprehensive plan to improve the agricultural sector with advance irrigation techniques like sprinkle and drip irrigation. It is most efficient mode of irrigation for water-scarce areas. Due to commissioning of a large number of deep tube-wells, most of the karezes have dried and are out of service especially in Kalat, Mastung, Quetta, Pishin and Killa Saifullah. So repair of karezes and proper management of groundwater will contribute to improve water needs of the province. This will go a long way towards boosting agriculture specially fruit cultivation, which is the livelihood of the people in the whole province. Fruits from Balochistan are supplied, on a large scale, to all parts of the country and exported to a number of countries as well. But unethical and unchecked use of underground water through tube wells has brought down ground water level. In certain areas like Nasai in Killa Saifullah district which, once has been apple producing area is now facing lowering of ground water level. Now the situation has touched dangerous levels where apple production has gone down.

To improve water supplies to orchards and irrigated lands certain steps will be favorable towards improvement of the system such as plantation along watershed areas, rehabilitation of rangelands, controlling flash floods and enhancing fuel wood production. Recharging of groundwater and aquifers are necessary and proper preservation of rain water is essential through dams and reservoirs. Strategies should be devised to conserve environment through water development and planning. One such step towards this could be institutionalizing water supply system through a Water Board or Water Resource Management Authority. It will certainly improve the scenic and landscape beauty and environmental deterioration occurring in the region. The greenhouse agriculture can further improve the opportunities like horticulture and vegetable production.

The food security for the people of Balochistan, can be achieved through enhancing the productivity of crops, livestock and forestry by utilizing modern technologies and transferring them to the farmers in the province. The establishment of agro-based industries like dairy industries will be highly beneficial for the people of Balochistan. There should have been a

control on deforestation and implementation of strict rules for illegal cutting of trees especially in the areas of juniper and chilghoza. Each year thousands of trees are cut down just for some local traits. If this process is not stopped sooner or later this precious wealth will be lost.

The mineral deposits in Balochistan need special attention. The development of these deposits along with the growth of new industries in many of the underdeveloped districts should certainly enhance their development level to a considerable degree. If government pays serious attention towards the establishment of these Export Processing Zones, it will be a very positive step for strengthens the Balochistan's economy and hence a precious gift for local people.

Marketing opportunities abroad have been realized which should be done by producing varieties consistent with the choice and demand of foreign markets. This would ensure that Balochistan farmers and horticulturists are incorporated in the international trading system with long-term attendant benefits together with the foreign exchange inflows.

Tourism can be developed as an industry in Balochistan. By virtue of its natural treasure-trove, captivating scenery, significant sites of multifold importance, variety of flora and fauna, diversity of climates and unique geology, possess huge potentials in tourism. The province can emerge as prime focus of attention of foreign tourists for its archaeological importance. Discovery of first Dinosaur fossil at Barkhan district and presence of mud volcanoes along the coast near Hingol River has opened new fields of study and research for vertebrate paleontologists, taxonomists, geologists and ecologists from all over the world. Like other provinces, it is necessary to establish tourism development corporation in Balochistan and encourage private sector to provide their services for the promotion of tourism in the province. The tourist sites should be secured, furnished and facilitated with necessary services and basic infrastructure.

Balochistan is geographically well-placed to play an increasing role in regional cooperation, linking landlocked Afghanistan and Central Asia with the Middle East and South and Southeast Asia. It will certainly improve and promote economic and social development in the province and thus will reduce the wide regional disparity. With the functioning of Gwadar Port an era of development will start along with increasing trade activity in Balochistan. It will thus certainly play a vital role in the development of the country. This study suggests that the districts with poor levels of development need proper attention of planners and policy makers, especially those located in the rugged inaccessible interior of the province.

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Fig-1

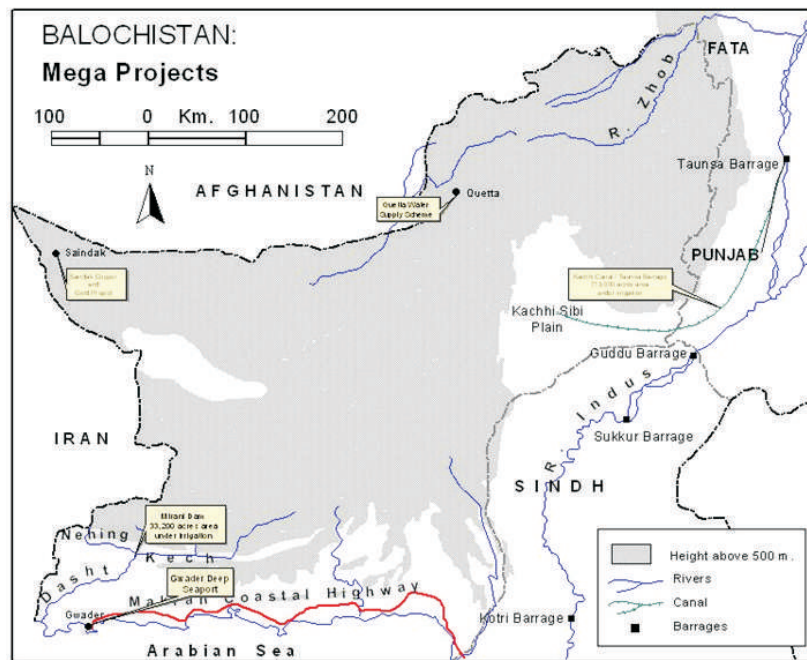


Fig-2

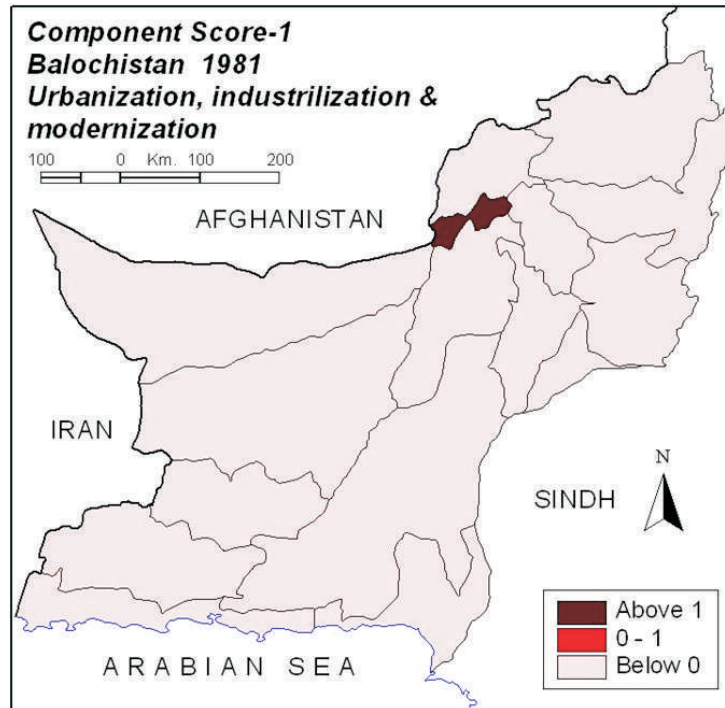


Fig-3



Fig-4



Fig-5



Fig-6

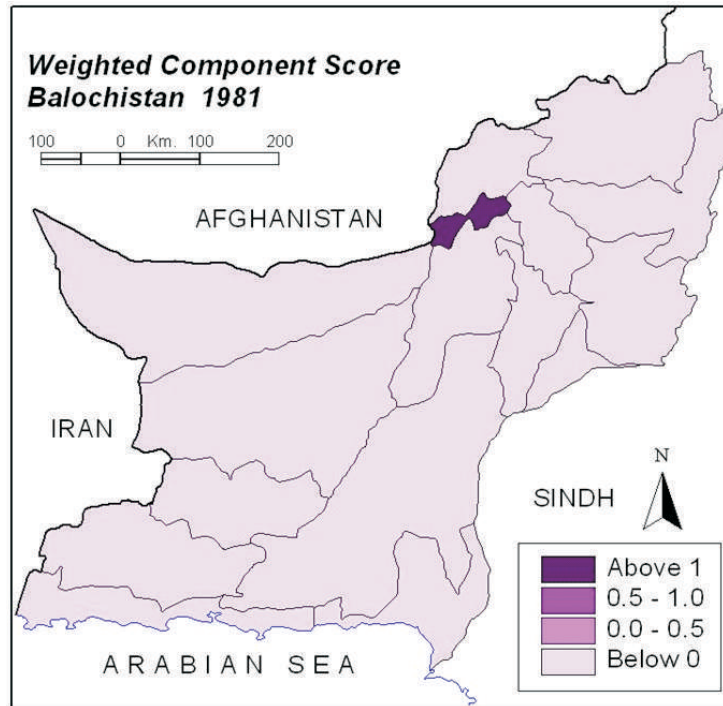


Fig-7



Fig-8

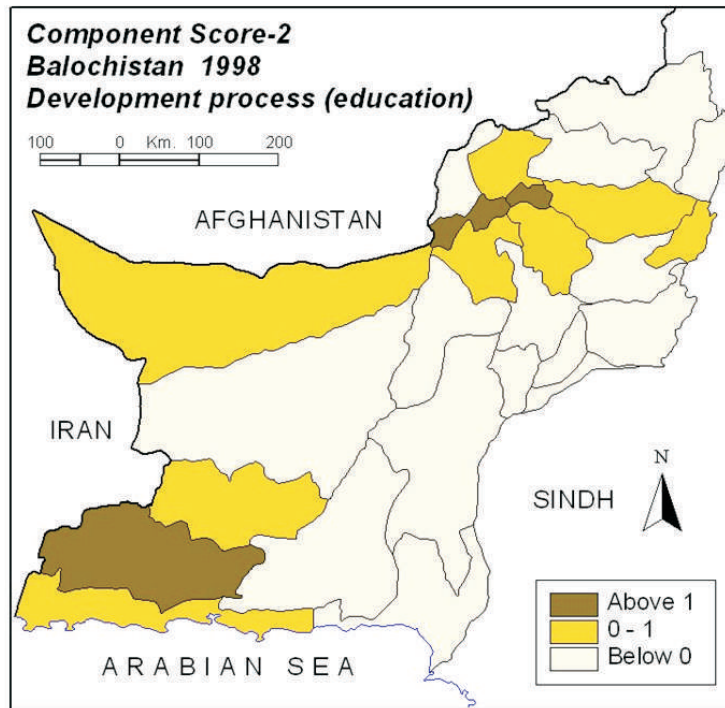


Fig-9



Fig-10



Fig-11

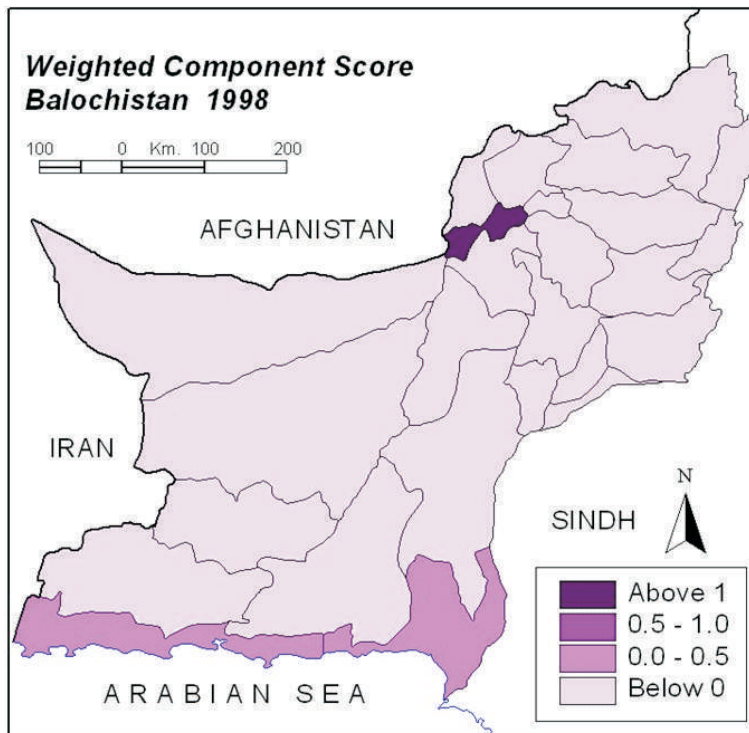


Fig-12

## **Patterns of urban growth in the Punjab 1951 1998**

ABDUL GHAFAR

Department of Geography, University of the Punjab, Lahore

### **Abstract**

Urbanization is the most important phenomenon in the present times. Urban centres provide comprehensive opportunities for employment, industrial growth, academic & health facilities as well as better socio-economic conditions. Punjab is the most populated province of Pakistan and hence a large number of urban centres. In spite of the agrarian economy of the Punjab, urban centres have been increasing since 1951 due to natural increase as well as rural-urban migration. The aim of this study is to measure the patterns of urban growth in the Punjab.

### **Introduction**

Human settlements have emerged with the history of mankind. These settlements have been transformed from merely capitals of the countries to urban centres with the passage of time. Since 19<sup>th</sup> century with the dawn of industrial revolution in the modern world, these urban centres have become the centres of socio-economic and cultural activities. The state of the art facilities in present times have been initiated from these urban centres for commercial purposes. Study of these urban centres has been a major focus in the field of geography.

Starting from the development of central place theory which have been applied all over the world to study functions of central places (urban centres) various aspects of urban centres such as socio-economic patterns, cultural dynamic in the cities to demographic conditions as well as internal urban infrastructure to transport, academic & health and employment facilities. However, growth of urban centres has been a major focus of these studies, since this growth influence the overall socio-economic and cultural aspects of a country. Population growth is the most important factor which has been contributing the growth of urban centres in present times.

Jones (1997) has thoroughly evaluated the patterns of urbanization in Asia. A number of scholars (Berry & Garrison, 1958; Johnson, 1972; Klaassen, 1981; Pacione, 2001 and Smith, 1965; Taylor, 1949) have contributed to explore the various aspects of growth of urban centres in various parts of the world. The main focus of these scholars has been to find out the influence of socio-economic factors. However, other factors such as population migration, political unrest and govt. policies in industrialization have also been considered and examined. In Pakistan, since its independence in 1947, urban growth has emerged in various parts of the country. Old urban centres such as Lahore, Karachi, Rawalpindi, Faisalabad etc. have expanded tremendously along with emerging of new urban centres in the country. Although, study of urban growth has been neglected by the scholars at large, however, some scholars carried out their studies to see the patterns of urban growth in Pakistan particularly in the Punjab. This study is an effort to see the patterns of urban growth in the Punjab.

### **Growth of urban population in the Punjab**

There has been a steady growth of population in the Punjab since 1951. Table 1 shows the inter-censal growth of total and urban population in the Punjab by districts. There has been growth of population in all districts. However, some districts reflect more percentage change. Major population growth has occurred during the period 1961-72. During the period 1951-98 tremendous population change in terms of percentage has occurred in Bahawalpur (361),





*Patterns of urban growth in the Punjab 1951-1998*

**Table 1:** Percentage change of population by districts, 1951-98

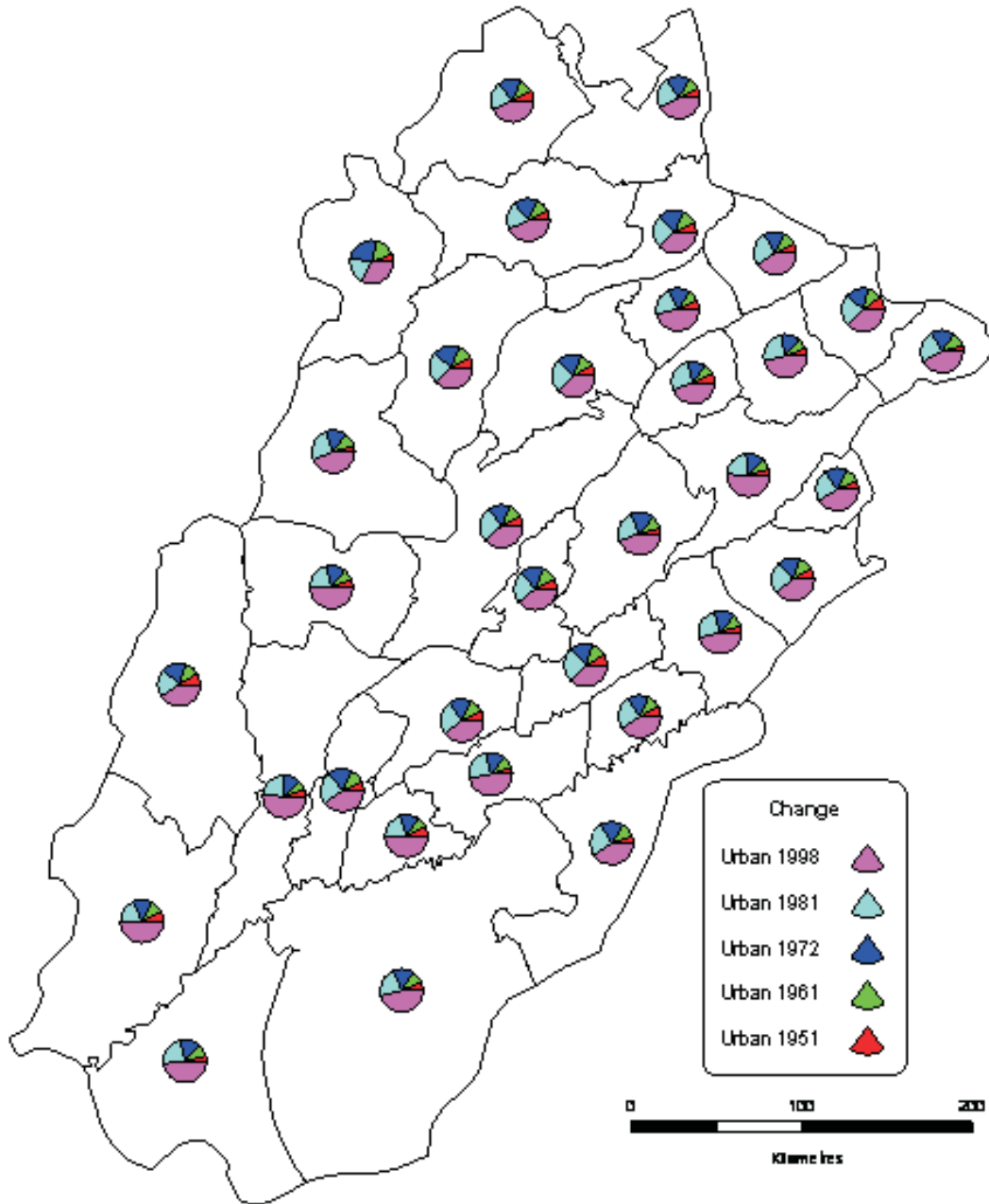
District	Total Population					Urban Population				
	1951 - 1961	1961 - 1972	1972 - 1981	1981 - 1998	1951 - 1998	1951 - 1961	1961 - 1972	1972 - 1981	1981 - 1998	1951 - 1998
Attock	10	41	17	45	162	39	56	25	106	459
Bahawalnagar	31	31	28	50	227	107	57	49	60	676
Bahawalpur	39	46	36	67	361	47	63	47	102	609
Bhakkar	42	50	33	58	350	117	56	60	74	838
Chakwal	10	38	12	40	138	55	60	18	104	497
Dera Ghazi Khan	24	45	38	74	332	36	51	23	88	370
Faisalabad	29	59	13	52	251	119	89	36	86	945
Gujranwala	26	62	31	61	328	42	71	79	85	703
Gujrat	12	41	20	45	176	32	57	65	59	446
Hafizabad	16	52	28	47	231	13	71	85	71	516
Jhang	23	46	27	44	228	28	65	56	49	390
Jhelum	13	43	11	42	155	79	59	28	54	465
Kasur	12	39	29	55	212	22	50	49	64	347
Khanewal	22	38	28	51	225	49	52	51	58	440
Khushab	34	51	18	41	238	37	85	16	57	366
Lahore	43	59	37	78	457	53	67	36	74	506
Layyah	68	81	35	68	591	44	67	49	130	724
Lodhran	26	54	32	58	305	14	63	52	131	554
Mandi Bahauddin	18	47	17	37	180	12	108	28	119	551
Mianwali	31	44	20	48	235	157	70	-20	58	447
Multan	36	53	31	58	330	80	50	39	65	517
Muzaffargarh	22	49	40	76	347	30	63	100	119	826
Narowal	7	52	9	39	147	165	60	40	70	909
Okara	13	36	32	50	206	70	84	54	89	807
Pakpattan	16	40	37	53	238	30	51	62	61	411
Rahim Yar Khan	53	38	32	71	373	128	79	47	105	1135
Rajanpur	23	50	40	73	347	21	51	30	159	517
Rawalpindi	25	61	22	59	286	41	90	32	76	522
Sahiwal	23	27	36	44	205	55	46	43	50	385
Sargodha	24	41	23	39	198	32	70	37	49	356
Sheikhupura	17	53	27	57	260	66	80	55	129	956
Sialkot	9	44	19	51	183	10	49	49	50	268
Toba Tek Singh	15	53	5	43	163	44	56	35	65	400
Vehari	26	46	29	57	274	83	70	69	85	869

**Source:** PCO

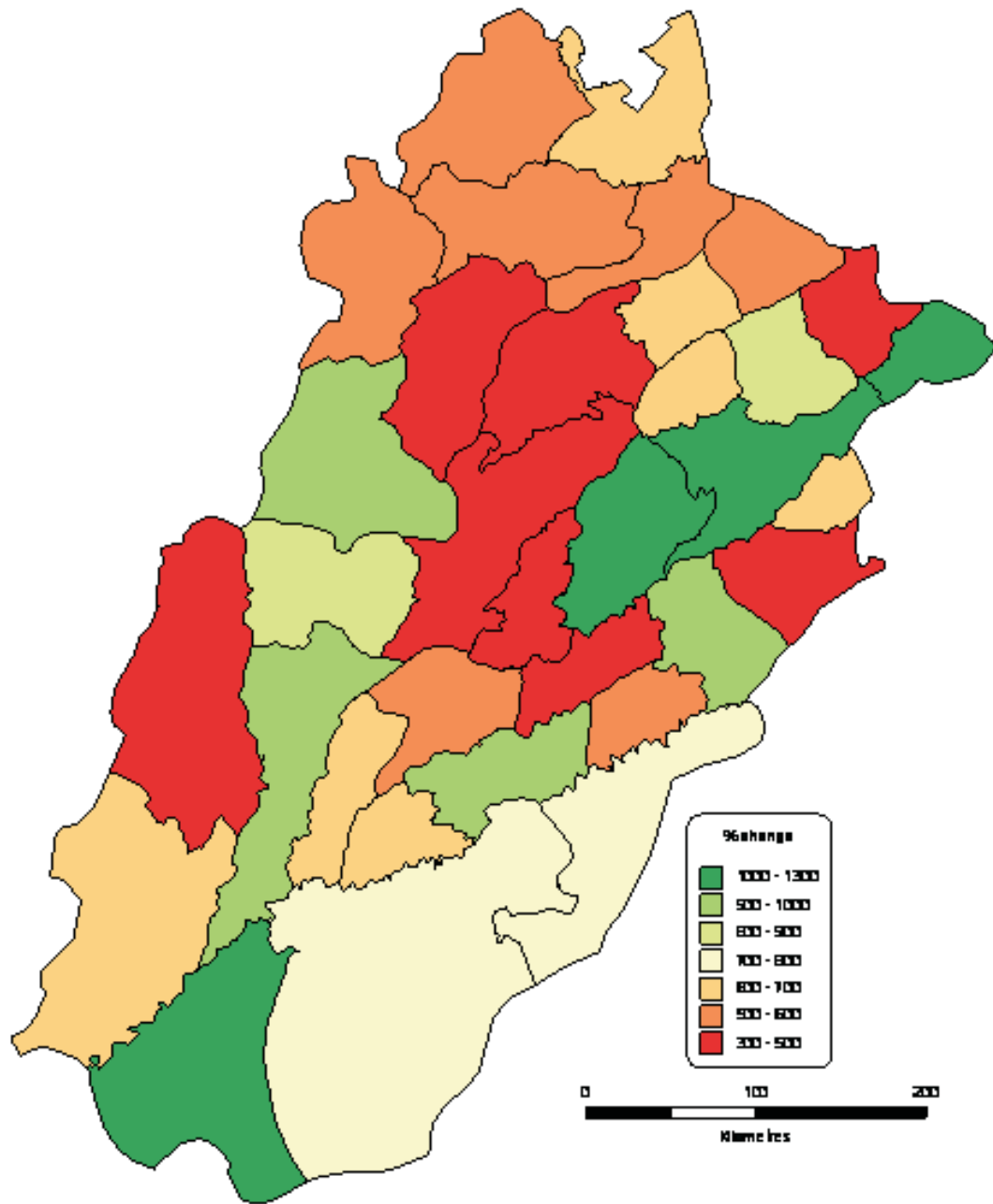
**Table. 2:** Percentage of urban population by districts, 1951-98

<b>District</b>	<b>Urban % 1951</b>	<b>Urban % 1961</b>	<b>Urban % 1972</b>	<b>Urban % 1981</b>	<b>Urban % 1998</b>
Attock	9.97	12.64	14.06	14.99	21.26
Bahawalnagar	8.03	12.75	15.30	17.83	19.05
Bahawalpur	17.77	18.81	20.99	22.71	27.34
Bhakkar	7.69	11.72	12.15	14.57	16.04
Chakwal	4.85	6.80	7.90	8.32	12.15
Dera Ghazi Khan	12.79	13.96	14.49	12.92	13.93
Faisalabad	14.33	24.38	28.95	34.99	42.70
Gujranwala	26.93	30.31	32.12	44.00	50.55
Gujrat	14.01	16.48	18.33	25.34	27.74
Hafizabad	14.66	14.32	16.13	23.36	27.27
Jhang	15.66	16.22	18.31	22.51	23.39
Jhelum	12.47	19.84	22.12	25.48	27.68
Kasur	15.97	17.33	18.76	21.70	22.83
Khanewal	10.62	12.94	14.27	16.79	17.61
Khushab	18.34	18.75	23.03	22.72	25.28
Lahore	75.72	81.01	84.98	84.30	82.44
Layyah	10.79	9.21	8.48	9.42	12.86
Lodhran	8.99	8.16	8.66	9.96	14.52
Mandi Bahauddin	6.53	6.20	8.75	9.54	15.20
Mianwali	12.74	24.93	29.45	19.60	20.82
Multan	29.40	39.01	38.21	40.48	42.18
Muzaffargarh	6.26	6.67	7.28	10.42	12.95
Narowal	2.99	7.36	7.79	9.98	12.20
Okara	7.76	11.63	15.80	18.33	23.04
Pakpattan	9.42	10.57	11.40	13.45	14.24
Rahim Yar Khan	7.52	11.21	14.59	16.30	19.63
Rajanpur	10.50	10.35	10.40	9.69	14.51
Rawalpindi	32.99	37.45	44.22	47.84	53.16
Sahiwal	10.31	12.99	14.90	15.70	16.38
Sargodha	18.40	19.58	23.66	26.32	28.13
Sheikhupura	8.93	12.65	14.84	18.04	26.22
Sialkot	20.17	20.47	21.10	26.36	26.19
Toba Tek Singh	9.93	12.44	12.65	16.36	18.83
Vehari	6.19	9.00	10.45	13.65	16.05

**Figure. 2:** Growth of urban population by districts, 1951-98



**Figure. 3** Change in urban population by districts, 1951-98



*Patterns of urban growth in the Punjab 1951-1998*

**Table 3:** No. of urban localities in the Punjab by districts

District	1951	1961	1972	1981	1998	Change 1951-98	%Change 1951-98
Attock	2	2	3	4	7	5	350
Bahawalnagar	6	6	8	8	8	2	133
Bahawalpur	6	5	8	8	8	2	133
Bhakkar	2	2	3	5	6	4	300
Chakwal	2	2	2	2	3	1	150
D. G. Khan	2	2	2	2	2	0	100
Faisalabad	5	5	5	5	8	3	160
Gujranwala	9	9	9	12	13	4	144
Gujrat	6	7	8	9	9	3	150
Hafizabad	2	2	2	5	5	3	250
Jhang	6	6	8	10	10	4	167
Jhelum	3	4	7	6	7	4	233
Kasur	7	8	9	9	9	2	129
Khanewal	5	6	6	8	8	3	160
Khushab	4	6	7	6	7	3	175
Lahore	2	2	2	4	4	2	200
Layyah	2	2	2	2	4	2	200
Lodhran	3	3	3	3	4	1	133
Mandi Bahauddin	3	2	3	3	5	2	167
Mianwali	3	6	6	6	8	5	267
Multan	4	4	4	5	6	2	150
Muzaffargarh	5	6	7	7	8	3	160
Narowal	1	5	5	5	5	4	500
Okara	4	4	7	7	9	5	225
Pakpattan	2	2	2	2	2	0	100
Rahim Yar Khan	5	6	7	7	8	3	160
Rajanpur	4	4	4	4	6	2	150
Rawalpindi	6	7	7	9	10	4	167
Sahiwal	2	2	2	2	3	1	150
Sargodha	11	12	14	13	14	3	127
Sheikhupura	5	11	11	11	15	10	300
Sialkot	6	6	10	11	11	5	183
Toba Tek Singh	3	4	4	4	4	1	133
Vehari	3	3	3	4	6	3	200

**Source:** PCO

**Table 4.** Growth of urban centres by population size, 1951-1998

Population	1951	1961	1972	1981	1998
100000 and above	6	7	15	20	36
80000 - 100000	1	3	2	4	11
60000 - 80000	4	4	6	10	12
40000 - 60000	3	8	13	18	34
20000 - 40000	16	22	35	59	80
up to 20000	112	121	120	97	68

**Source:** PCO

1951, there were only 142 urban centres in the Punjab which have increased to 241 in 1998 reflecting 172% change in no of towns. Table 3 shows the increase in No. of towns in the districts of the Punjab. New urban centres have emerged in every district. Major changes have emerged in the districts of central Punjab which is the most populated area of the Punjab. Moreover, most of the people who migrated from India to Pakistan settled in the Central Punjab because this part of the province has the most fertile land of the country. The settlement of immigrants from India to this area contributed the development of socio-economic structure of the area. A large number of industries have been established in the Central Punjab.

Table 4 shows the No. of urban centres by population size. There have been changes in the number of centres. It is evident from the table that in 1951 a large no of centres have population up to 20 thousands. However, in 1998, no of centres have declined from 112 to 68 only. Whereas increase in nos have emerged in all categories. No. of centres having population 100,000 and above have increased six times from 6 to 36 between the period 1951-1998.

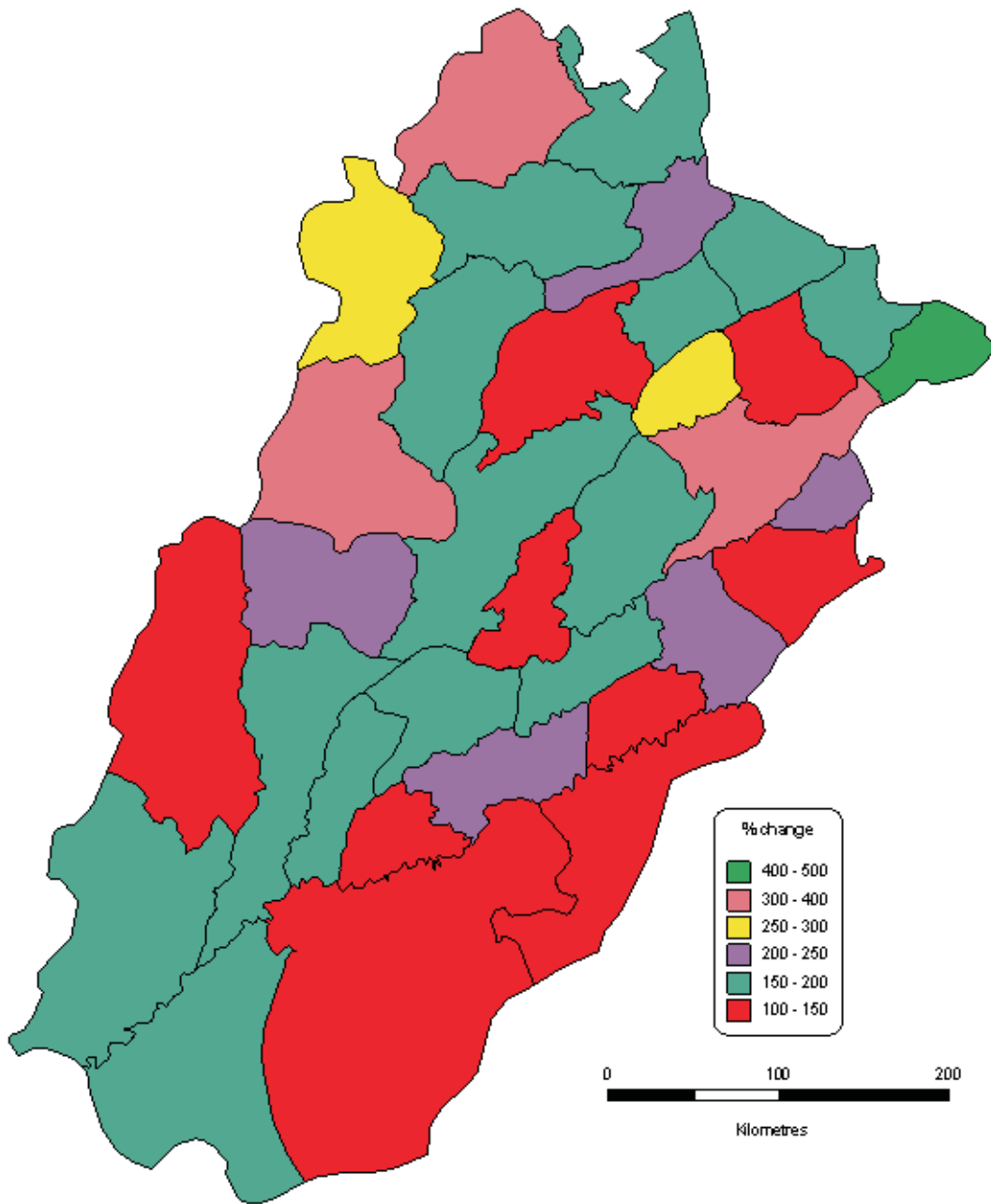
### **Growth of major cities**

Table 5. describes the population growth of major cities of the Punjab from 1951 to 1998. It is very much clear from the table that Lahore remained the largest city of the Punjab since 1951 (859,221) to 1998 (5143,495). An overall growth of population has emerged in all cities. However, some variation have been found amongst the cities growth apart from the natural increase which are mainly due to the population migration from rural to urban areas in search of employment, education and health facilities. Highest increase can be seen in Faisalabad (1021%), Gujranwala (837%), Bahawalpur (776%), Sheikhupura (843%) and Rahim Yar Khan (1465%).. Figure 5 represents the comparative growth patterns of population in major cities. Due to the variation in population growth apart from natural increase, ranks of these cities have been changing during the period 1951 to 1998. (Figure 6). Lahore remained the 1<sup>st</sup> largest city of the Punjab. However, a number of cities such as Sialkot, Kasur, Sahiwal, Chiniot and Khanewal lost their ranks in 1998 as compare to 1951 and some cities (Gujranwala, Bahawalpur, Wah Cantt, Sheikhupura and Rahim Yar Khan) have gained higher ranks from 1951 to 1998. Figure 7 represents the rank size variations between the major cities of the Punjab as per Rank Size Rule. There have been changes in the ranks of major cities during the period 1951 to 1998.

### **Conclusion**

It is evident from the data that there has been tremendous urban growth in the Punjab since 1951. Apart from the natural increase urban population has been growing because of other pull factors of urbanization. For instance, employment is one of the factors which attracted

**Figure. 4:** Percentage change in urban localities by districts, 1951-98

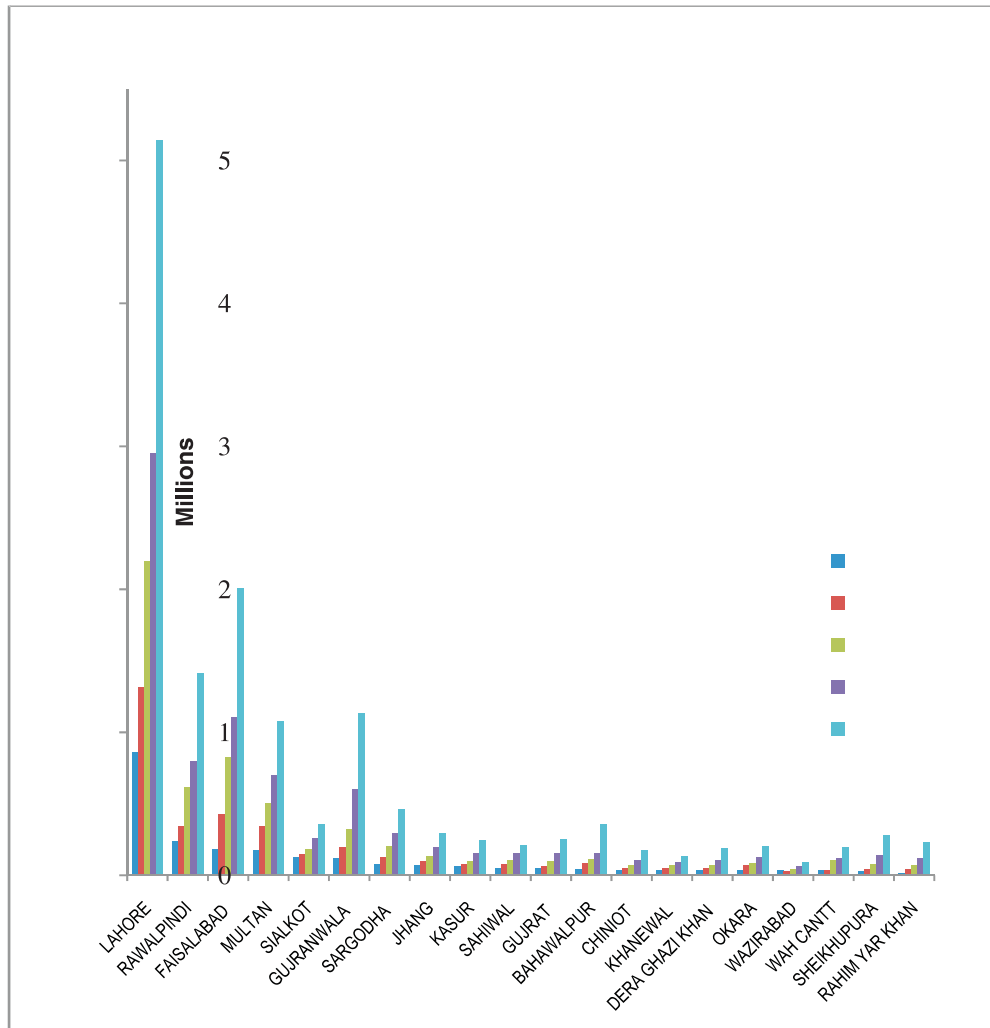


**Table. 5:** Population growth of major cities, 1951-98

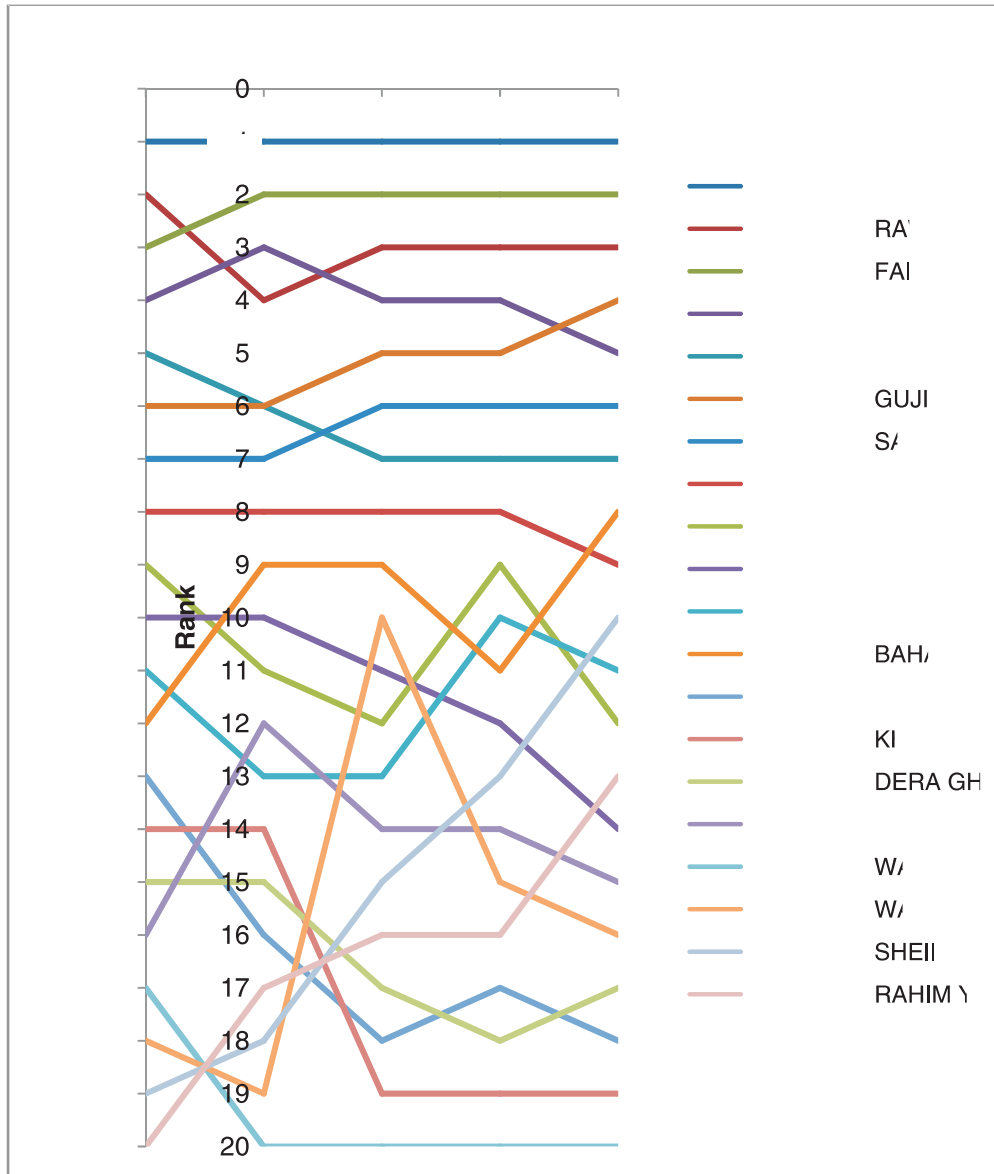
<b>City</b>	<b>1951</b>	<b>1961</b>	<b>1972</b>	<b>1981</b>	<b>1998</b>	<b>% change</b>
LAHORE	859,221	1,317,119	2,198,890	2,952,689	5,143,495	499
RAWALPINDI	236,877	340,175	614,809	794,843	1,409,768	495
FAISALABAD	179,127	425,248	823,343	1,104,209	2,008,861	1021
MULTAN	175,429	340,399	504,365	696,316	1,078,245	515
SIALKOT	124,267	146,837	183,685	258,147	358,376	188
GUJRANWALA	120,852	196,154	323,880	600,993	1,132,509	837
SARGODHA	78,447	129,291	200,460	291,362	458,440	484
JHANG	73,397	94,971	131,843	195,558	293,366	300
KASUR	63,086	74,546	101,295	155,523	245,321	289
SAHIWAL	50,185	75,180	106,648	150,954	208,778	316
GUJRAT	46,971	59,608	100,333	155,058	251,792	436
BAHAWALPUR	40,698	84,377	115,660	152,009	356,626	776
CHINIOT	39,042	47,099	70,108	105,559	172,522	342
KHANEWAL	37,915	49,093	67,746	89,090	133,986	253
DERA GHAZI KHAN	35,909	47,105	72,343	102,007	190,542	431
OKARA	35,350	68,299	84,334	127,455	201,815	471
WAZIRABAD	33,027	29,399	40,063	62,725	90,197	173
WAH CANTT	32,823	37,035	107,510	122,335	198,891	506
SHEIKHUPURA	29,717	41,635	80,560	141,168	280,263	843
RAHIM YAR KHAN	14,919	43,548	74,262	119,036	233,537	1465



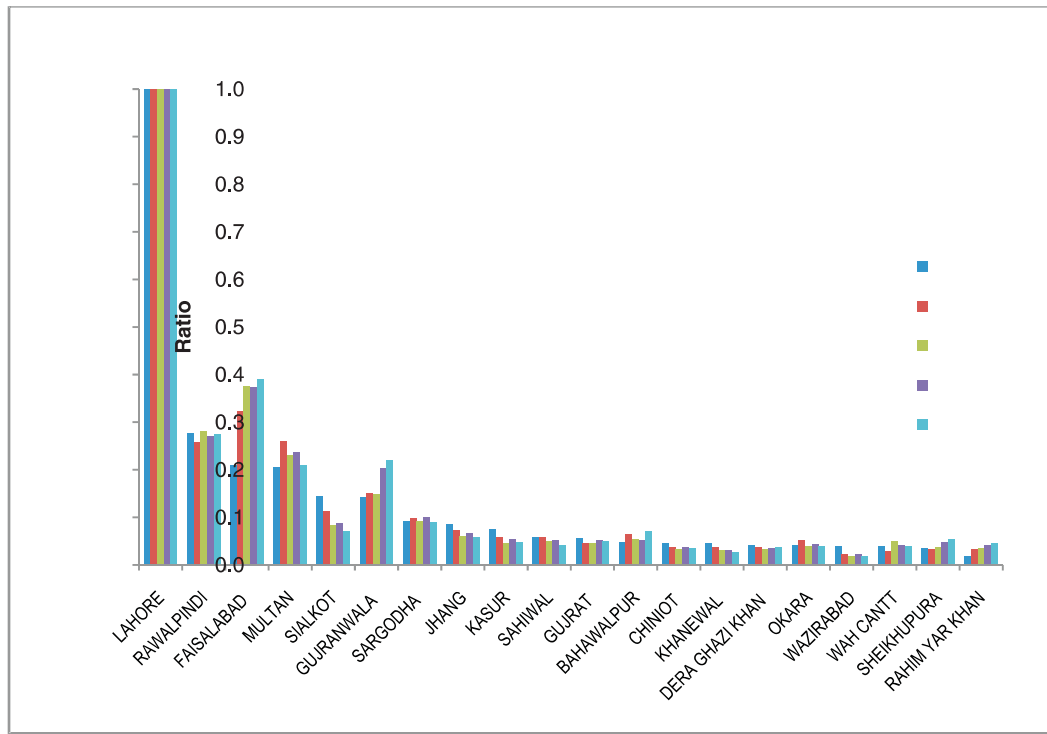
Figure 5. Population growth of major cities of the Punjab



**Figure 6:** Patterns of Ranks in major cities of the Punjab, 1951-98



**Figure 7:** Rank sizes of major cities of the Punjab, 1951-98



the labour force from rural areas. Moreover, Education and health facilities are the major causes of urbanization in the Punjab. Because of the increase in urban population the status of rural centres has also been changed from rural to urban which has been reflected from the growth of total number of urban localities in almost all districts of the Punjab. Due to the variation of urban growth amongst various urban centres, ranks of the urban centres has also been changed with the passage of time from 1951 to 1998. Major growth has emerged in those cities which are industrial cities such as Faisalabad, Sheikhupura, Rahim Yar Khan and Gujranwala. So industrialization has been the most important factor of urban in the Punjab as well as in urban centres. Other factors are rural to urban migration due to the availability of better education and health facilities.

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## **Solid Waste Management and Associated Environmental Issues in Lahore**

**IBTISAM BUTT\* AND ASIF IQBAL\*\***

\*Department of Geography, University of the Punjab, Lahore. \*\*Solid Waste Management Department, City District Government, Lahore

### **Abstract**

Solid waste management is the most essential house keeping service required by urban dwellers to maintain their quality of life. Unfortunately in Pakistan, the service lags behind, leading to some chaos in the urban sector. Institutional weaknesses, shortage of human and financial resources, improper technology, inadequate coverage, improper collection, transportation, disposal and lack of our all proper planning are associated with the weakness of solid waste management in most Pakistani cities. This has significant implications for the health of residents, municipal staff, and industrial workers and over all urban investment climates. Keeping in view the issues, problems and the risks associated with municipal solid wastes, their management and their resulting effects on the urban environments the present research aims to analyze patterns of municipal wastes particularly solid waste, the prevailing the functions and disposals system, associated institutional and administrative flaws and the resulting Impacts on the urban environment in Lahore City District Government.

### **Introduction**

Cities emerge, flourish, develop, expand and finally change their forms. They are nodal points, commercial hearts, central places, transport foci, industrial hubs, and recreational centers, jungles of man kind, architectural showcases, and prides of nations. But where these urban agglomerations bring many potential advantages, several disadvantages are also enclosed with them. Global experience shows that when a country's urban population reaches almost 25% of the overall population, the pace of urbanization accelerates and ultimately it creates many infrastructural deficiencies, of which solid waste and environment is one of the hottest issues around the globe and a matter of grave concern to modern world. The increase in population and migration into cities has created serious environmental problems including inadequate solid and liquid waste management, lack of safe water and minimal pollution control. Over crowding, housing congestion, all of which contribute to an unhealthy urban environment. Communities living near the dumpsites also suffer the nuisance of smoke and smell, and such cities as well as uncollected waste in general attract rodent and flies, which provide a transmission route for diseases-improper disposal of municipal solid waste has serious results for the environment and human health responsible for creating many infections diseases. Solid waste has also contributed heavily to ground and water and air pollution levels. Ground water contamination, wind blown waste, dust and gases caused by decomposition, putrefaction of waste in sunlight during day time results in bad smells and reduced visibility are all the outcomes of ill planned and poor management of municipal solid wastes (G.O.P. 2005).

### **The Study Area**

Lahore the second largest city of Pakistan and the provincial capital of Punjab, having 1772 sq. km of land area and approx. 8 million population, lacks in proper refuse collection and waste disposal. According to the estimates of City District Government Lahore (CDGL), the total generation of municipal solid waste is approx. 4000 tons per day, while 35 to 40 % of the

**Table 1** Composition & Quantity of Solid Waste Produced Per Day in Lahore

S.No	Description	Tons Per Day	% Weight
1	Vegetables & Fruit Residues	1182.7	32.72
2	Paper	104.0	2.70
3	Plastic & Rubber	216.8	5.63
4	Leaves, Grass, Straws etc.	770.0	20.02
5	Rags	286.8	7.45
6	Wood	47.7	1.24
7	Bones	39.7	1.03
8	Animal Waste	90.5	2.53
9	Glass	27.0	0.70
10	Metals	12.3	0.32
11	Dust, Dirt, Ashes, Stones, Bricks	1070.5	27.83
12	Unclassified	0.4	0.01
	Total	3860	100.00

**Source:** SWMD, City District Government Lahore, 2005.

solid waste is left uncollected per day. There is only one legal open dumpsite and a number of illegal dumpsites located at or near large residential areas, near Ravi bed, and many other sites totally unsuitable for such activity. The present study focuses at the existing practices of Solid waste management, and the resulting environmental issues in Lahore.

### **Methodology**

This research is based upon secondary data sources i.e. reports published by different public and private organizations. Besides this some concerned authorities were also interviewed and personal observations were made through visits to dumpsites and sanitary workshops. The following departments were consulted:

- Solid Waste Management Department, Lahore.
- City District Government, Lahore. (CDGL)
- Environmental Protection Department, Lahore. (EPD)
- Environmental Protection Agency (EPA).
- Lahore Development Authority (LDA).
- The Urban Unit, Government of Punjab, Lahore.

### **Generation & Composition of Solid Waste**

According to the data obtained by the Solid Waste Management Department, Lahore, the total amount of solid waste generated in the city is 3860 Tons per day. The generation rate is 0.55 kg per capita per day. This waste is mostly composed of residues of vegetables and fruits, abandoned plastic bottles, broken glass, animal discard and many unclassified materials (Table 1). Most of the recyclable things like tin, newspapers, glass ware are used by the scavengers and so on.

### **Management of Solid Wastes**

The Solid Waste Management Department (SWMD) is responsible for the collection and disposal of the solid waste within the limits of City District Govt. Lahore. The District Nazim heads the SWMD. For administrative purpose and public convenience the city is further divided in nine towns and each town is headed by an Additional District Officer (ADO). The

**Table 2** Details of Carriage Fleets involved in Secondary Collection

Description	Number
Mazda/Isuzu Truck	94
Compactor	22
Nissan Arm Roll	50
Mazda Arm Roll	31
Arm Roll (Tractor)	18
Mechanical Sweeper	27
Wheel Loader	11
Dumper	21
Tractor with Trolley	36
Chain Bulldozer & Gali Sucker	06
Tractor Loader	24

**Source:** SWMD, City District Government Lahore, 2005.

further details of organization can be analyzed from Figure. 1. The waste management is carried out mainly in following three steps:

### 1-Primary Collection:

In first step, the sanitary workers and sweepers collect the garbage from residential and commercial units and clean the streets through manual and mechanical sweeping. Each sweeper has been employed for 01 sq.km and removes 0.6 tons of waste daily. The total number of sanitary workers at towns is 6897. Afterwards the collected waste is shifted to the dustbins, containers, and skips provided by the SWMD at different storage points within the city. Mostly the public dumps the refuse on the road side, streets, walkways, vacant lots etc. According to rough estimates over 3000 open dumps are lifted by SWMD from the streets and roads of the city. But still around 30 to 40% waste still remains uncollected due to difficulty in mechanical sweeping. This makes the area unsightly, and the disease producing vectors are spread all around the dumping area thus causing a constant health hazard for the surrounding residents

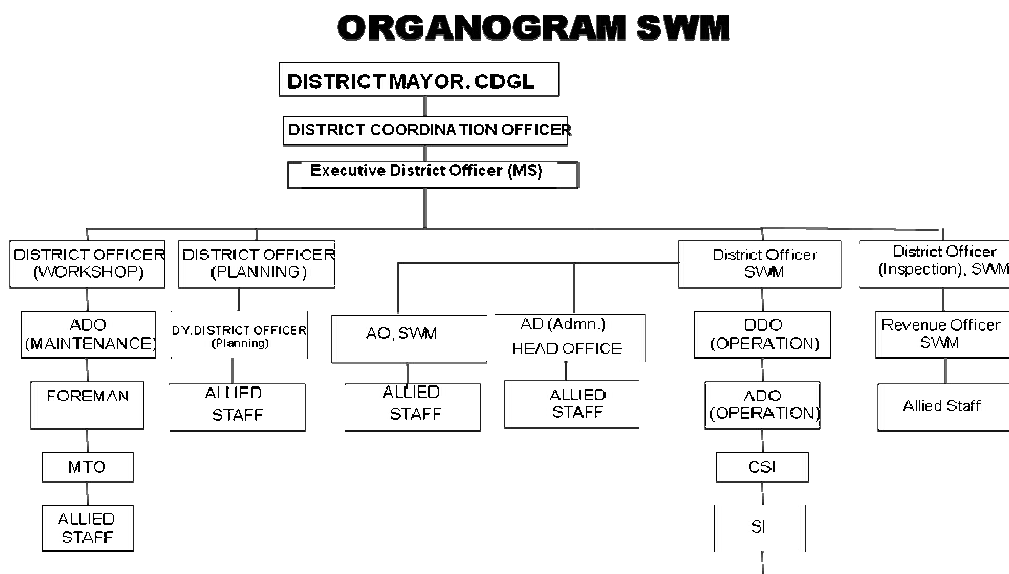
### 2-Secondary Collection:

In the second step, the solid waste gathered from the storage points and finally hauled to transfer station or dumping sites for final disposal. Secondary collection is done with the help of different collection vehicles such as Mazda Truck, Compactor, Arm roll, Mechanical Sweeper, Loader, Gali Sucker, and Chain Bulldozer etc (Table 2). The frequency of collection is theoretically daily except on Sunday, while some of street side dumps, skips and containers remain untouched for long period. Most of the time unavailability of these carriage fleets also hampers the efficiency of the collection.

### 3 Final Disposal:

The third step involves the final disposal and waste processing of the collected solid waste using different techniques such as burning, open dumping, Incineration etc. Unfortunately, the present practice of solid waste disposal in the city is not planned at all. It comprises of illegal dumping at numerous unplanned locations, which are either within residential areas or near by them. Mostly open dumping is also carried out in the old ponds, depressions, active flood plain of River Ravi and other low Lying areas. This practice is creating complex and serious environmental problems and adversely affecting public health. Besides open

Figure 1



dumping, open burning is also used as disposal method in Lahore to reduce the waste volume, which is highly hazardous as it creates different toxic gases and clouds of smoke and causes pollution problems for the neighbor hoods.

### ABBREVIATIONS

- ADO =Assistant District Officer
- DDO =Deputy District Officer
- MTO =Motor Transport Officer
- AO =Account Officer
- CSI =Chief Sanitation Inspector
- SI =Sanitation Inspector
- ASI =Assistant Sanitation Inspector
- SWM =Solid Waste Management

### Associated Environmental Issues

The environmental problems which are resulting due to the existing practices of solid waste management by the SWMD are subdivided into three categories and discussed as followings:

#### Aesthetic Conditions and Urban Decay:

The uncollected solid waste from streets and storage points at various points in different parts of the city has greatly hampered the aesthetic beauty of the city. Besides this the unplanned and illegal open dumping within and near by residential areas are making these areas unsightly. Because of wind direction, paper and polythene bags are seen scattered in the adjoining areas. Dogs, cats, and other animals also consume certain edibles from the waste. The odor and dust coming out of these large heaps of waste are additional to this picture. All this are greatly destroying the beauty of countryside, urban area and national heritage and also lowering the land values due to the location of illegal dumpsites particularly in Shahdra, Shalimar, and Nishter Town.



### **Health risks and Diseases:**

A variety of health risks are associated with improper handling and poor management of solid waste in Lahore. Although for the general public health, the main risks to health are indirect and arise from the breeding of disease vectors such as flies, mosquitoes and rodents and rats that live in and around the refuse and promote a variety of diseases such as Diarrhea, Cholera, Enteric Fever, Typhoid, Paratyphoid, Hepatitis, Malaria, Yellow Fever, River blindness, Dengue, Plague etc. Moreover the health risks related to the sanitary workers who are engaged in manual sweeping and other functions with out any precautionary measures are at a high risk of many skin and intestinal parasitic diseases etc.

### **Pollution:**

The unsafe methods adopted by the SWMD are also polluting the environment of the city as contamination of crop land area is taking place due to open dumping of industrial waste and toxic material along Ravi bed and nearby residential areas. While more and still unrecognised is the transfer of pollution to surface water by washing the debris and then polluting the ground water in the form of leachate particularly in the flood season in Babu Sabu and Mehmood Boti dumpsites. Besides this toxic gases and great volume of smoke is emitted during the open burning of this collected waste which again is a great source of air pollution. The noise pollution associated with the carriage fleet also creates disturbance for the surroundings.

### **Suggestions:**

- Sweepers and inhabitants of the area should not be allowed to throw their waste outside the containers.
- SWM department should use the out fall road transfer station to increase the collection efficiency.
- Workshop should be expanded to accommodate the increased demand for the new equipments or vehicles used in the management of solid waste and mini workshops should be established in each administrative town
- Waste should be properly disposed off i.e. sanitary landfill should be properly operated.
- Toxic waste should be land filled separately and records kept of the data of disposal, the material and the position.
- Rodents, flies and mosquitoes can be controlled by frequent covering of compacted waste by soil and by sparing insecticides. Odor can also be controlled by covering the compacted material by soil.
- Post monitoring of the landfill sites should be considered.
- Solid waste management staff from top to bottom should be trained in the respective jobs.
- No solid waste management plan can be successful unless it receives general public support in letter and spirit. Public suggestions and opinions may also be obtained before finalizing the adoption of the new system.
- General public should be educated to avoid littering habit and abide by the principle, "Never throw the waste on the ground, always put in containers".
- Privatization in solid waste management services should also be considered, which is estimated to be more economical.

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