



Assessing the Urban Growth and Morphological Patterns of Gojra City, Pakistan

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Abstract: The rapid urban growth of cities being witnessed all over the world is most striking in the developing countries like Pakistan where a number of urban centers have sprung up over the last few decades. This tremendous increase in population and urban development accompanied by various contributing factors viz. employment opportunities, educational and health facilities has brought massive changes in urban pattern and morphology of even the small cities like Gojra which is currently expanding beyond its administrative boundaries with a notable influx of surrounding countryside people. Geographic techniques have been utilized and demographic data have been evaluated with the purpose of identifying the urban growth patterns and morphology of the city of Gojra. The findings suggest that increase in areal extent in different directions and unprecedented urban growth created several issues of land use to the dwellers as well as managing authorities. Amongst, the issues of agricultural land loss, irregular settlements with sprawl, rising land values etc. were significant. The study concluded that in order to comprehend the Spatio-temporal dynamics of rapid urban expansion and morphology patterns of Gojra City, the usage of geographic techniques has helped a lot to manage and channelize the growth directions and land use management by formulating comprehensive land use management plan.

Keywords: Urban Growth, Morphological Pattern, Land use, Gojra City.

1. INTRODUCTION

Throughout the World, the pace and tempo of urban growth in number of regions is most prominent and dynamic geographic phenomenon. It is the nature of humans to accomplish a high standard of living accompanying with an urban center (Zhang, 2009). For the first time in 2008, the global urban population equalized to the global rural population with 50% share and now it is anticipated that the urban population would rise to 84% by 2050 with an estimated urban inhabitants of 6.3 billion that was only 3.4 billion in 2009 (UN, 2009; UN, 2010). Mostly, these urban centers are concentrated at the core of cultivable land and trend of rapid urban growth has accelerated in peripheral areas (UNFPA, 2007). In the past few decades, witnessing an enormous growth of urban areas responsible for reshaping the demographics was recorded (Araya, 2009).

A recent study at Wuhan urban agglomeration, China found that due to rapid urban growth, the total area of urban land expanded from 203.66 km² in 1980 to 1,370.07 km² in 2010 (Lu *et al.*, 2014). Using RS and GIS techniques a study conducted in Zanjan city, Iran indicated that during 1984-2011 the great changes in land use took place with the conversion of productive lands (arable, orchards) into built-up areas, establishment of industrial sites and road highways (Reveshty, 2011). The rate of urban growth is much higher in developing countries as compared to developed countries (Tewolde, 2011). Although the rate

of urban growth linked with socioeconomic rise and developmental changes varies throughout the world, yet it is significantly higher in the countries like Pakistan (Mandelas *et al.*, 2007; Yesserie, 2009).

Being an important sub-discipline of urban geography, the morphology of urban areas deals with the growth patterns, layout, structure and physical form of the cities and towns (Mandelas *et al.*, 2007; Foubert *et al.*, 2009). The extension of the city in different directions with dispersing patterns indicates the changing way of urban morphology over time and space (Goetz *et al.*, 2009). By realizing these patterns of growth, policy makers and planners get better insight into factors leading to the haphazard development for present and future perspectives (Yesserie, 2009). In order to study urban growth matters in a broad and sustainable manner, the utilization of GIS and RS technologies assist greatly in spatial analysis and can be used efficiently for maintaining database of land use and land cover (LULC) development of urban settlements (Bhalli, 2011; Shirazi and Kazmi, 2014).

Previously, a number of studies were conducted on the urban growth and morphology of some Pakistani cities like Lahore, Lyallpur (Faisalabad) and Multan and described in terms of city layout, building density, housing types, open spaces and functional characteristics (Mushtaq, 1967; Bukhari, 1971; Hameed, 1976). Later, as the trend of urbanization and urban growth accelerated not only in big urban centers but

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also in medium urban centers in Pakistan more studies have been conducted in order to access and quantify the land use and morphological changes. Among these, Noor (2004) analyzed the growth and morphological pattern of Bahawalpur City. Bhalli, (2011) identifies the spatial pattern of Faisalabad city during 1981-2010, Afsar (2001) applied Remote Sensing technique on Karachi to monitor urban growth and land cover/land use change mapping for detection in Karachi, Riaz (2011) identified the population growth impact on Lahore during 1951-1998, Mohsin and Bhalli (2015) conducted a study on urban growth in Bahawalpur and found that rapid urban growth had profoundly altered the city's municipal limits and brought notable land use changes.

Additionally, some of these studies assessed the conversion and loss of precious agricultural land in response urban growth into various urban uses at alarming rates. Mohsin, (2014) highlighted the urban growth in the form of housing schemes and the resultant conversion of precious farmland in Bahawalpur city, Samiullah (2012) conducted a study in Peshawar, results show that the city has been growing at a very fast pace in recent years and in the absence of planning and control has experiencing tremendous urban sprawl and loss of agricultural land. Bhalli and Ghaffar, (2015) concluded in a study conducted in Lahore that 40.81% of urban built-up area had increased and agricultural land had declined by 12.98% during 2000-2014. Hence, dramatic urban growth has put enormous stress on land resources and highly modified the land use and morphological patterns of most of Pakistani cities. Therefore, the current study aims at identifying the urban growth and patterns of urban Morphology in Gojra City by utilizing of geographic technique.

2 MATERIAL AND METHODS

2.1. Study Area

Gojra is one of the tehsils of district Toba Tek Singh of the Punjab province of Pakistan. It was initially founded as a small town to serve as a grain market of cash crops. It is a grain market of cereal crops such as wheat, maize, and oil seeds. A former kamraid (councilor) from Gojra town said that wheat was transported from Gojra to Madras (Chennai India) and administrative of this Mandi was Lala Kirpa Ram (A Hindu) and most of the traders in this town before independence were also Hindu. It is located at 33°16'60N 73°20'60E almost center of the province Punjab (Fig. 1). The City is located 30 miles (50 km) away south East from Faisalabad and 20 miles (32 km) north of tehsil Toba Tek Singh (PMDFC, 2008). It is famous as an Olympic village of hockey in Asia. The history of Gojra is a century old and the city is

dominantly inhabited by Muslim population who supported the Pakistan Movement actively.

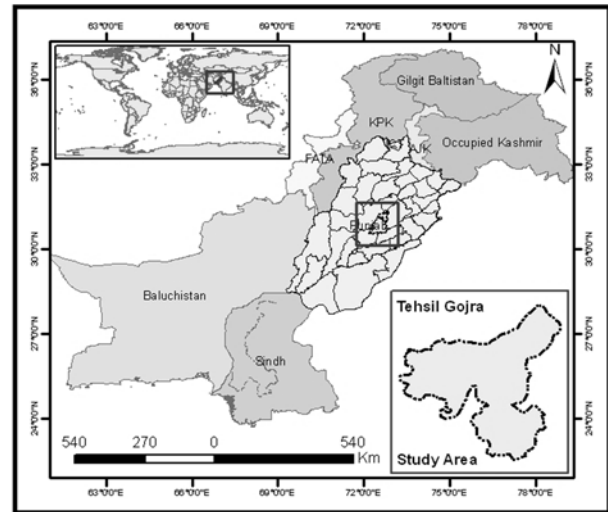


Fig.1: Map of the Study Area Gojra City

2.2. Data Collection and analysis

The current study is descriptive in nature, focusing on social, demographic and spatial aspects of the Gojra city. Data for the current study was obtained from a number of sources like Punjab Municipal Development Fund Company (PMDFC), Google earth, census records, survey of Pakistan, official reports, thesis etc. Modifications have also been made in the data particularly in map making of the study area and visualizing the land use changes. The analysis of the study highly is based on geographic information system (GIS) with the creation of a number of comprehensive maps by applying various GIS functions, e.g. overlaying, geo referencing, rectifications etc. the final maps indicated the morphology and land use changes due to rapid urban growth in past few decades. Moreover, demographic and census data were also used for the analysis and comparison of population and selected demographic indicators during last two national censuses (1981 and 1998). Additionally, the history, land use characteristics and urban growth trends were also discussed briefly.

3. RESULTS AND DISCUSSION

3.1. Historical Development of City

Word 'Gojra' has originated from 'GowShala' means field of cow grazing. Gojra is encircled with two water channels one from its northern side named 'Boudh' and other from its southern side. The land of Gojra is suitable for the domestication of cows and other animals' ranching on its ample grasslands and people are engaged in the supplying milk to neighboring areas. Before independence, these people also supplied milk to Royal Army in the battle against "Ray Ahmad

yarkharl” and famous as ‘Jangli’ means illiterate and uncivilized (Rafique, 2012).

A sins carat *alum swami AtamAnand* (303) described in 1943, *GowShala* conference “Gojra” region of cattle and cow grazing people which are also called *Gujjar*. History of Gojra is not too ancient as it is only a century old and local people engaged in cow domestication were called *Gujjar*. The early settlers migrated from Gujarat and Gujranwala about 1760 and were called nomads. The town was founded in 1896 after the colonization of *Lyallpur* (Faisalabad) started. The British government launched a development plan in 1892 for this part of *Rachna Doab* (area between river Ravi and Chenab, now included in Faisalabad division) and consequently lower Chenab canal was built and the canal rest house is the oldest building constructed in 1898. In 1899, first railway link was established between Gojra and Faisalabad that later was extended to Toba Tek Singh and Shorkot tehsils (Rafique, 2012).

At that time, Gojra City was a famous village named *Chak* (Rural settlement) No. 470 and for trading purpose of agricultural products and crops a *Mandi* (Market) was established in 1894. Gojra is popular for eye surgery as its reputation for ophthalmic brilliance was well known all over the colonial Subcontinent. Moreover, the city also kept a special place regarding the national game of Hockey. It is known as the Hockey town of Asia and produced many world class hockey players, coaches and umpires. Now a day so many clubs are running for hockey coaching in Gojra and they train the players, both male and female.

The City is still the nursery for many hockey players of national and international repute (Rafique, 2012).

3.2. Municipal Committee Status

Gojra was declared a B class municipal committee in the year 1925 and a post office was constituted in 1928 followed by telephone service in 1936. In 1927, just after the visit of Gojra by Viceroy Hind Lord Kurzen, the authority was granted to a Magistrate of Gojra Sir Madi Shah for the allotment of land. After independence, due to increasing size, Gojra was decelerated a 2nd class municipal committee in 1960 (PMDC, 2008; Rafique, 2012).

3.3. Tehsil status

In 1982, Gojra became Tehsil headquarter as it is one of the most fertile parts of the upper Indus plain in central Punjab and also famous as an Olympic village of hockey in Asia. A famous trade Mundi (market) consists of 133 small villages and the population of proper city 200,000 people (Rafique, 2012). In 2001, the devolution of powers was introduced by the government on local levels and consequently the municipal committee was declared Tehsil Municipal Administration Gojra (PMDC, 2008).

3.4. Area and Demography of Tehsil Gojra

Gojra Tehsil spreads over an area of 916 square kilometers with a population of 495,096. Gojraurban population was 117,892 as per 1998 census and the annual average growth rate of tehsil was 3.29 (GoP, 2000). The population projected 191,584persons in 2013 is expected to rise to 366,036persons in 2033as shown in (Table 4).

Table 1: The Demographic Details of the District and Gojra Tehsil as Per 1998 Census

Administrative Unit	Area Km ²	Population 1998							Pop. 1981	1981-1998 Avg. Annual Growth Rate (%)
		Both Sexes	Male	Female	Sex Ratio	Population Density/ Km ²	Urban Proportion	Avg. HH Size		
T. T. Singh District	3,252	1,621,593	831,602	789,991	105.3	498.6	18.8	7.1	1,134,572	2.12
T.T.Singh	1,000	617,035	314,658	302,377	104.1	617.0	9.7	7.1	435,280	2.07
Gojra	916	495,096	254,054	241,042	105.4	540.5	23.8	7.2	357,172	3.29
Kamalia	1,336	509,462	262,890	246,572	106.6	381.3	25.0	7.0	342,120	2.37

Source:GoP, 2000

Table 2: Urban and Rural Population of Tehsil Gojra in 1998 and 2015

Tehsil	Population (Thousand Persons)						1998 Urban Population %
	AS Per 1998 Census			Estimated on 31-12-2015			
	Total	Urban	Rural	Total	Urban	Rural	
Goira	495	118	377	633	153	480	18.9

Source:GoP, 2015

Table 3: The Demographic Details of Gojra City

Year	City	Population 1998			Population 1981	1981-98 Avg. annual Growth rate (%)	Avg. HH Size
		Both Sexes	Male	Female			
1998	Gojra	117,892	60,598	57,294	68,000	3.29	7.6

Source:GoP, 2000

Gojra has population growth rate of 3.29 % as per 1998 Population Census, which is quite closer to the provincial average. The population of Town was 117,892 persons in 1998, and was estimated at 191,584 persons for 2013. Given the population growth rate and using 1998 as the base year for arithmetic growth method estimation, the population of town is likely to increase to 366,036 persons in 20 years from now (year 2033). The Population of Gojra has been projected over the next 20 years using the following formula:

$$P_n = P_o (1+r/100)^{n-1}$$

Where P_n = Population of the desired year, P_o = Population of the base year, r = Population Growth Rate, n = Number of years

Table 4: Gojra City Urban Population Projection

Sr. No.	Year	Population
1.	1998	117,892
2.	2013	191,854
3.	2018	225,242
4.	2023	264,814
5.	2028	311,338
6.	2033	366,036

Source: PMDFC, 2013

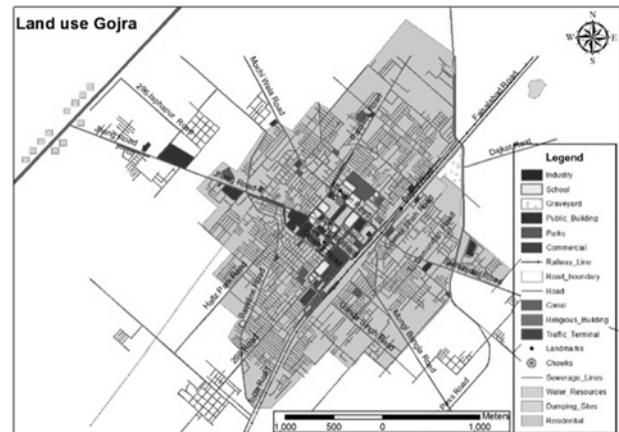
3.5. Land use Characteristics

Gojra is a well-planned city. All of the roads intersect each other at right angles. A railway track runs through the town from south west to north east direction. It passes through the center of the town. The central part of the town is the institutional zone. The most commercialized road of the town is the Toba Road. All major shops, hotels, clinics, the bus stand, the railway stations, iron and steel market etc. are located here. The railway station is also located here. Girls' primary school and EidGah are also present along this road. Going further north is the hub of institutional activities. There are schools, Girls Municipal Degree College and Boys Postgraduate College, Police station, courts, Tehsil office Judge House, Civil Hospital, etc.

The important roads along which these institutions are located are Cinema road, Thana City road, TNT road and Mission road. The roads that emerge out to different sides of the institutional zone are Hafiz Park road, Jhang road, Mungi Bangla Road, Samundri road, MochiWala Road and Pansera Road. The road that runs parallel to the railway line is the Dijkot Road. The residential area is located at all around the institutional zone.

Along Jhang road, that leads to the west of town has some public buildings like Government Eye Hospital, Thana Sadder and Powerhouse. The outskirts of the town are having sporadic development. There are

many vacant plots within the city area. The Gojra city has open spaces scattered in different parts of the town.



Source: Nasar-u-Minallah, 2015 (Edited)

Fig. 2: Land use Patterns of Gojra City

3.6. Urban Growth and Future Direction

Presently, the city is growing in all directions. Different provisional highways lead to different directions leading to the towns in the vicinity. These main highways provide opportunities for different land use as accessibility becomes easy. The most predominant land use that is expanding the town in all directions is the residential.

A number of residential small colonies are being established in the peripheral and fringe areas. These colonies are usually about 2 to 4 acres. These colonies are not established without proper planning, hence not integrated, and rather sporadically developed. All such development is taking place in the private sector by individual business groups.

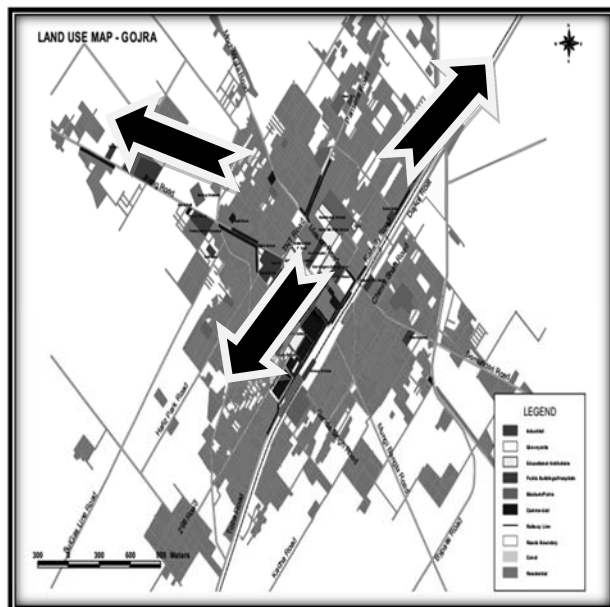
Most of the development is taking place along Pansera Road to Jang road. This is the north western side along which the city is growing. Now the concept of life line has shifted from Pansera Road to Jhang Road because Toba-Faisalabad Route crosses through Gojra and most population settled along Pansera Road. Hence the recent direction of city expansion is North South. District Hospital is located along Jhang Road which attracts more development like business activities and different small colonies and private houses are being developed on the either sides of these roads.

3.7. Growth Contributing Factors

The basic function of Gojra was grain market (mundi town) for surrounding area and transportation of these items to the other part of the subcontinent in past and northern Pakistan and adjoining Afghan border. But the main route G.T. Road and national highways approach Gojra from Jhang 25km North West and Samundri 30 km South East, in recent days a short route

era start due to straight route and by pas route are construction in Pakistan.

The location factor is contributing much in urban growth of Gojra. Because the above discussed routes are now crossing Gojra and most of the traffic automobile along with railway, furthermore the Faisalabad international airport is situated only 32 km from Gojra and it is equally beneficial for Faisalabad and Gojra. Enhancement of the better linkage is a key factor in the urban growth.



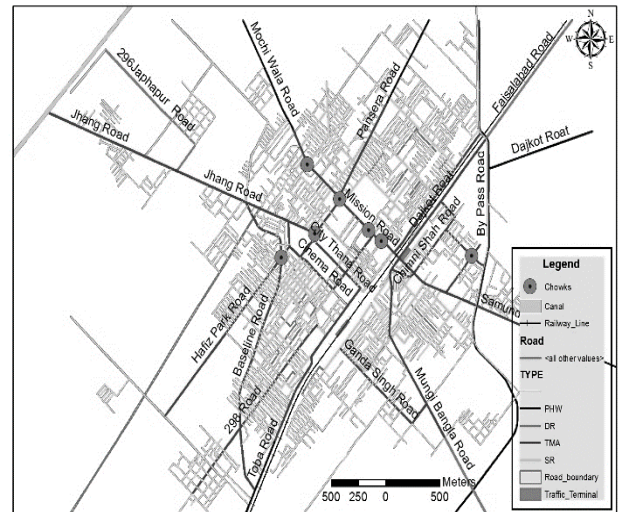
Source: PMDFC, 2008

Fig. 3: Future Urban Growth Direction

3.8. Road Network of Gojra City

The provincial highway connects the Gojra city with other main towns like Toba Tek Singh, Jhang, Sumandari and Dijkot. Motorway M4 connected the Gojra with Faisalabad and Toba tek Singh. These highways also shown in the road hierarchy map as Pansera and Dijkot Road link the town from northeast direction, Jhang road from west direction and Sumandari road from south direction.

Traffic is diverted from the center of the city running north-south direction by a provincial bypass that can be accessed by Pansera, Dijkot. Sumandari and Toba Tek Singh roads. In order to facilitate the flow of traffic in the city an underpass is located on railway tracks near the railway road. At the junction of mission road, there is a two way crossing of Dijkot road and the Sumandari road at bypass road near Dijkot road.



Source: Nasar-u-Minallah, 2015 (Edited)

Fig 4: Road Network of Gojra City

4.

CONCLUSION

The literature and analysis discussed above can be concluded that although the pheromone of urbanization is quite old yet the recent urbanization is the by-product of the expansion of economic activities and activities of immigrants. The study points out that the urbanization in this region was triggered by internal migrations, transport accessibility and due to agricultural activities. The Findings of the study revealed that the city is currently witnessing noteworthy growth in demographic, physiographic and morphologic patterns. The City's urban population was 117,892 as per 1998 census with annual average growth rate of 3.29. In 2008, it was about 157,764 and in 2015 it is estimated about 200,000. The City has developed and well-connected rail and rods links with others cities of the Punjab. The study suggest that two most important factors responsible for urbanization are transportation accessibility and connectivity. The transportation accessibility links the towns and intensify the urban growth patterns. Although, Gojra is a planned city, but presently is growing in all directions with a number of scattered residences and small colonies that being established in the peripheral and fringe areas. These colonies are usually not massive in the area, but brought significant land use modification in the morphological patterns of the city. Additionally, increasing urban population and economic development are also changing the face of the city. However, this study has demonstrated that there is a group of factors which is responsible for urban growth and among these accessibility plays a key role in the socio-economic development.

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