

## A Tale of an Orphan Mega City

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### Abstract

Urbanisation is a challenge faced all over the world as the cities have this charismatic economical horizons to attract people from all over the world, Karachi is one of among them it has a population of 25 million people with a density of 6000 people per m<sup>2</sup>. In this article I tried to explain the ethnical composition of the city as well trembling infrastructure of the city. The various communities are living without any cooperation, Religious, Ethnical and linguistic divide exist there, and political tug of war is merely for holding its economical bloodline. So keeping the increasing population of the city and the land in analysis I tried to visualise the future scenarios in three phases as I have the data of population in a year 2005, from that particular data I projected current situation of 2016 and predicted the future in 2050. As the population is inconsistent it can be increased or decreased but the land is fixed. Keeping these phenomena in my analysis I used ArcGIS software to visualise the previous, current and future situation.

**Keywords:** Jeopardize; Urban lifestyle; ArcMap; ArcGIS

### Introduction

Urbanisation is the biggest challenge of 21<sup>st</sup> century according to UN source by 2050, almost 70% of world population will be in cities, cities has glooming economic prosperity based on urban lifestyle. However cities always require constant development, innovative ideas and economic opportunities to maintain its social fabric. Population also plays a pivotal role in cities. The land and resources of the cities are fixed, planners and stake holders have to come up with new innovations which provide peace, prosperity and tranquillity among the citizens of the city [1].

I born and raised in a city called Karachi. So as a Karachite I am from the 7<sup>th</sup> largest city according to Population in the world. As mentioned in wikipedia, population of Karachi in 2015 would be around 24 million with density of 6000 people per square meter. Considering an unofficial source is more reliable than the census which have been done in 1998 by the state. However if the state dare to have an official census for Karachi it will reflect their chaotic management of the affairs, Collapsing infrastructure, infected health care system, jeopardize monitoring system, trembling societies leading to ghettos; all this matters are broiling above the hood.

### Ethnical Composition of Karachi

The ethnical composition of Karachi is so diverse mainly majority consist of Urdu speakers (migrated from India in 1947) following Pushtun, Punjabi, Sindhi, Balochi, Saraiki, Hazara and Gilgit mostly from all over the Pakistan. Moreover Karachi accommodated Afghan refugees during 1980 Afghan war, Bengalis, Nepalese, Sirilankans and Chinese are also the thread of this ethnical fabric. Further on the religious ground the majority is Sunni Muslim followed by Shias, Ahmedis, Hindus, Christian and Zoroastrian. When any cities have such a diverse composition of societies then it needs a little more effort to be managed. It is easier to do well among alike but an extraordinary effort required among numerous [2].

### Infrastructure of Karachi

Unfortunately A city which accommodates approx. 24 million people now a days is without any mass transportation network. However Karachi witnessed 90 years of tram network (1885-1975) but instead of improvisation it was halted afterwards circular railway system was also collapsed in 1999 since Karachi entered in millennia Karachiites barely witnessed any evolution in infrastructure. The

condition is wholly similar in other spars of urban infrastructure including roads, water, electricity, recreational or open spaces.

Now if one tries to understand this urban agglomeration, the piles of infection has rooted deep inside the social fabric due to its geopolitical situation. Mafias seize control of all the development of the city irrespective of their authorities and position in the society.

Common people suffers the humiliation in Public transport which are owned by private association and people who owned their vehicles mostly stuck in Traffic Jams. Buildings are constructing without any ethical conduct, building codes are undermine during construction. As population is increasing so as the demand of accommodation. Houses which were designed for single family consists of 5 to 7 person now accommodating 4 times of its capacity. This situation will ultimately affecting in every sphere of infrastructure [3].

On the other hand all this chaotic flaws affected every institution of the society from policing to public health, even the education all departments are decaying; religious believes are on the paramount. All this disorder already influenced the mentality of the society in general. People prefer to live within their communities which turning neighbourhoods into ghettos. To study this kind of condition in social behaviour would be an interesting subject for psychological students, public health professionals can also contribute in this study even more every department of social welfare could use modern techniques for improvisation.

### Optimism is the Only Cure

It requires lot of positive energy, attitude, and high moral to think differently and find a solution for issues where even animals are seems scared. But when one accepts the debacle around him and want to be a gear of change in the society then transition is inevitable, as St.

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Francis of Assisi quoted “Start by doing what is necessary; then what is possible and suddenly you are doing the impossible.” I graduated in civil engineering in 2011 and started my masters in 2014 from Anhalt University of Applied Sciences in Germany. My mentor, Professor Mathias Pietsch of Gis and remote sensing showed me the direction that how in Germany they are facing the challenges of urbanization and improving spatial planning of the cities by using GIS.

### Using GIS for Karachi

As I studied Karachi, core of all problem is abrupt increase of population parallel with haphazard settlements. Keeping this phenomenon in mind I started working on ArcGIS. To predict the future scenario from heuristic information I need datasets I tried to approach the authorities but could not able to get any datasets related to my queries so I started collecting reliable information available on internet and tried to make my own datasets for my argument [4-6].

### Administrative Boundary of Karachi

Karachi has 6 districts and cantonments. Provincial government is responsible for managing affairs related to districts of Karachi and cantonments falls in the jurisdiction of Federal ministry of defence. I could not able to get any data sets from official authorities of administration. However I collected the available data on their websites (Figure 1).

### Creating a shape file for Karachi

Firstly I created a Geodatabase of Karachi in ArcCatlog and created new vector (polygon) feature class and saved it as a shape file. From the official website of Karachi municipality. I have collected the details of towns with their population. However the result is available in image format, which looks like a screenshot taken from Google earth, demarcation of boundaries has been done from some image processing software, probably Photoshop. The jpeg is without any reference, nor with any projected coordinate system or neither any geographic coordinate system defined on the official webpage of Karachi municipality. Image below is the courtesy of Karachi Municipality Corporation’s official (Figure 2).

### Geo-referencing of districts

In Arc map I used a base map (imagery with labels) as a reference for the projection of these image files (district maps of karachi). A tool geo referencing is used for projecting the image on a geographical coordinate system provided by ArcGis online. In a tool geo referencing there is a command name, add control point. Before adding control point I selected the two identical landmark on the map which is visible on jpeg (district map without any coordinate system) and also identified on base map of ArcGis. Then clicked first control point on the image and then the same point on that particular identical landmark on base

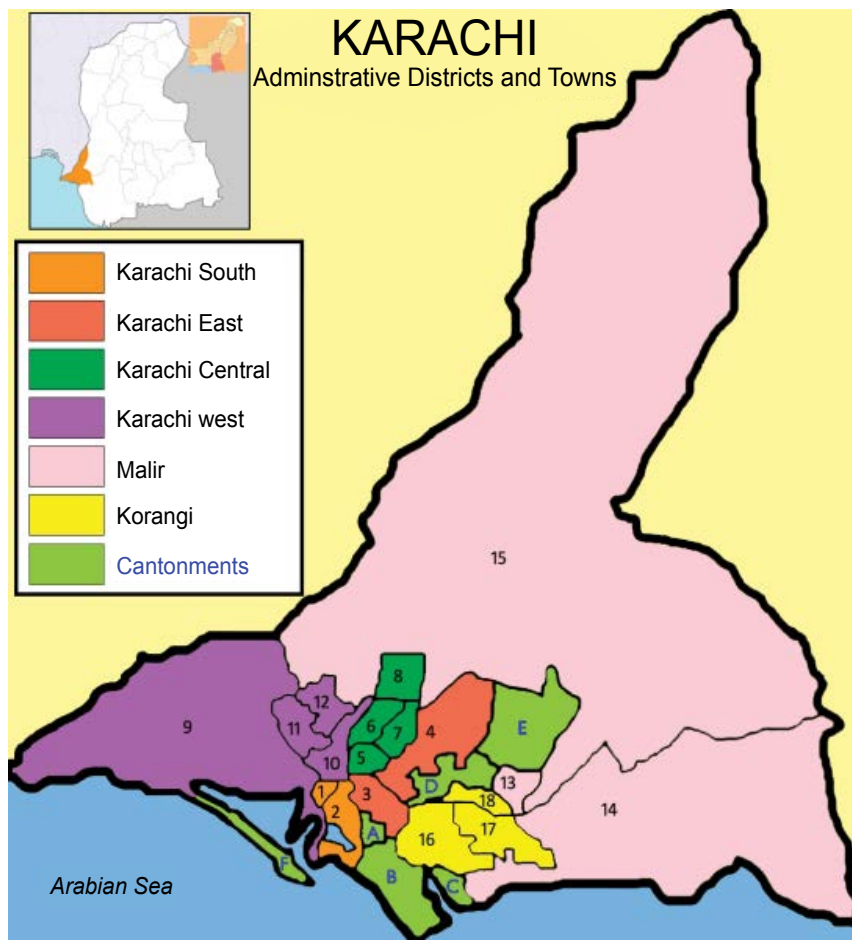


Figure 1: Administrative Boundary of Karachi.

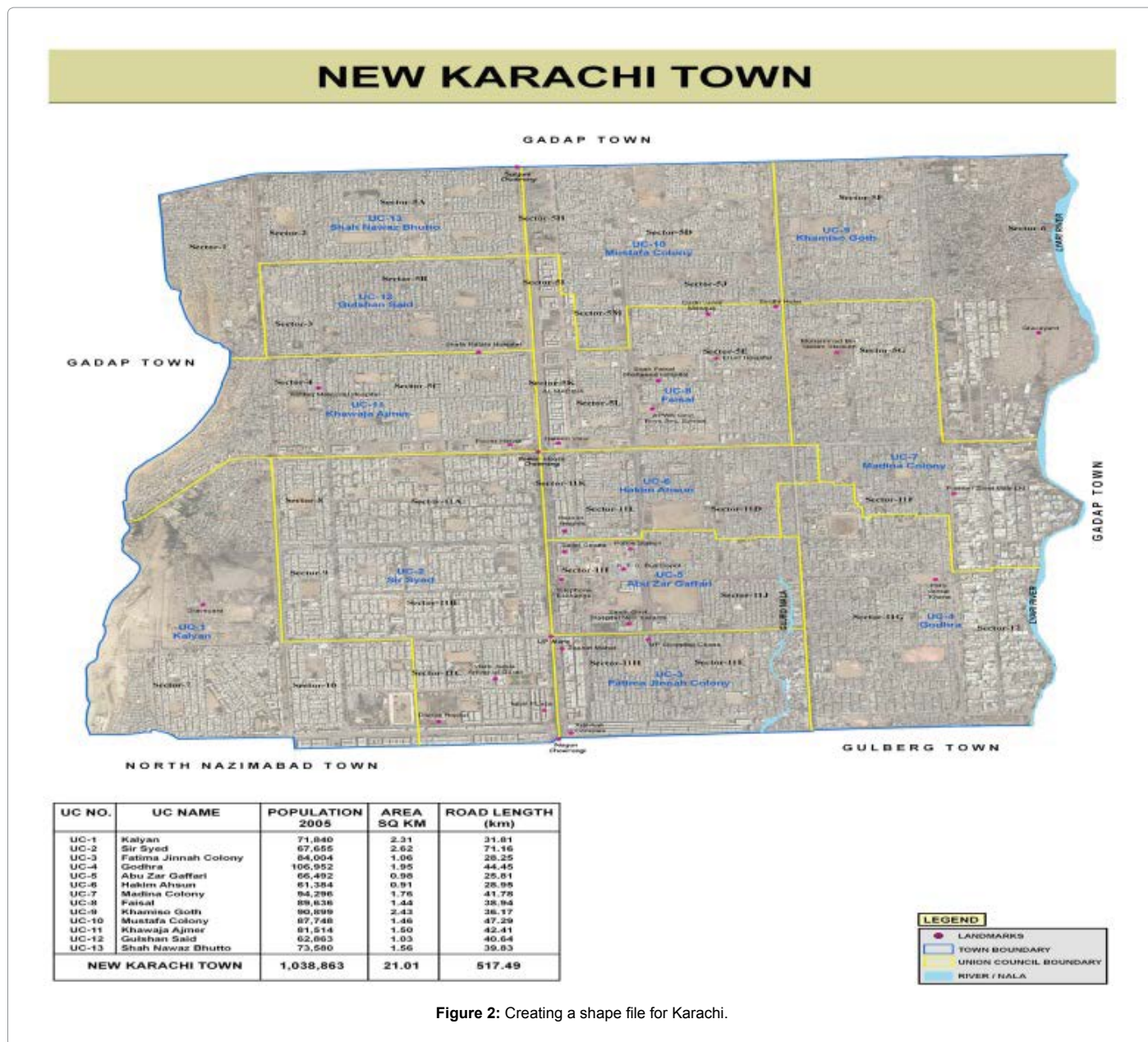


Figure 2: Creating a shape file for Karachi.

map [7]. Then 2<sup>nd</sup> control point on the corner of image and then on to identical location on the basemap. It defines the boundary of the district (image). Now update the display. For making it more accurate try to reduce the transparency of the image by going to the properties and then to the display in their; image transparency is set to 70% (Figure 3).

### Digitising polygon

After Geo referencing the next step is digitising. For that I loaded an empty shape file projected on WGS 1984 coordinate system. Now by using, start editing tool I start demarcating boundaries of the town as now the image is also projected on a WGS 1984. After making a polygon the area of the shape file is similar to the area mentioned on municipal website [8,9].

This boundary is created by using editor tool box through digitising a polygon however the shape of polygon is set to hollow for getting near to precise results (Figure 4).

### Digitising the Karachi

Yes! Digitising the whole city of Karachi on ArcGis by repeating the same process for every district was time taking job. However due to modern technology it made one's life easier to collect the data and make more datasets out of it.

There were 28 districts which were digitized during digitizing the city. The Geographical coordinate system of these shape files is WGS 1984 UTM zone 42 N. Projection, Transverse Mercator [10-13].

One important thing noticed during digitizing districts. There was mostly landmarks which were parks and recreational areas which can be seen in satellite imagery, probably taken in year 2005 turned into housing projects on the base map of ArcGis Online in 2016 (Figure 5).

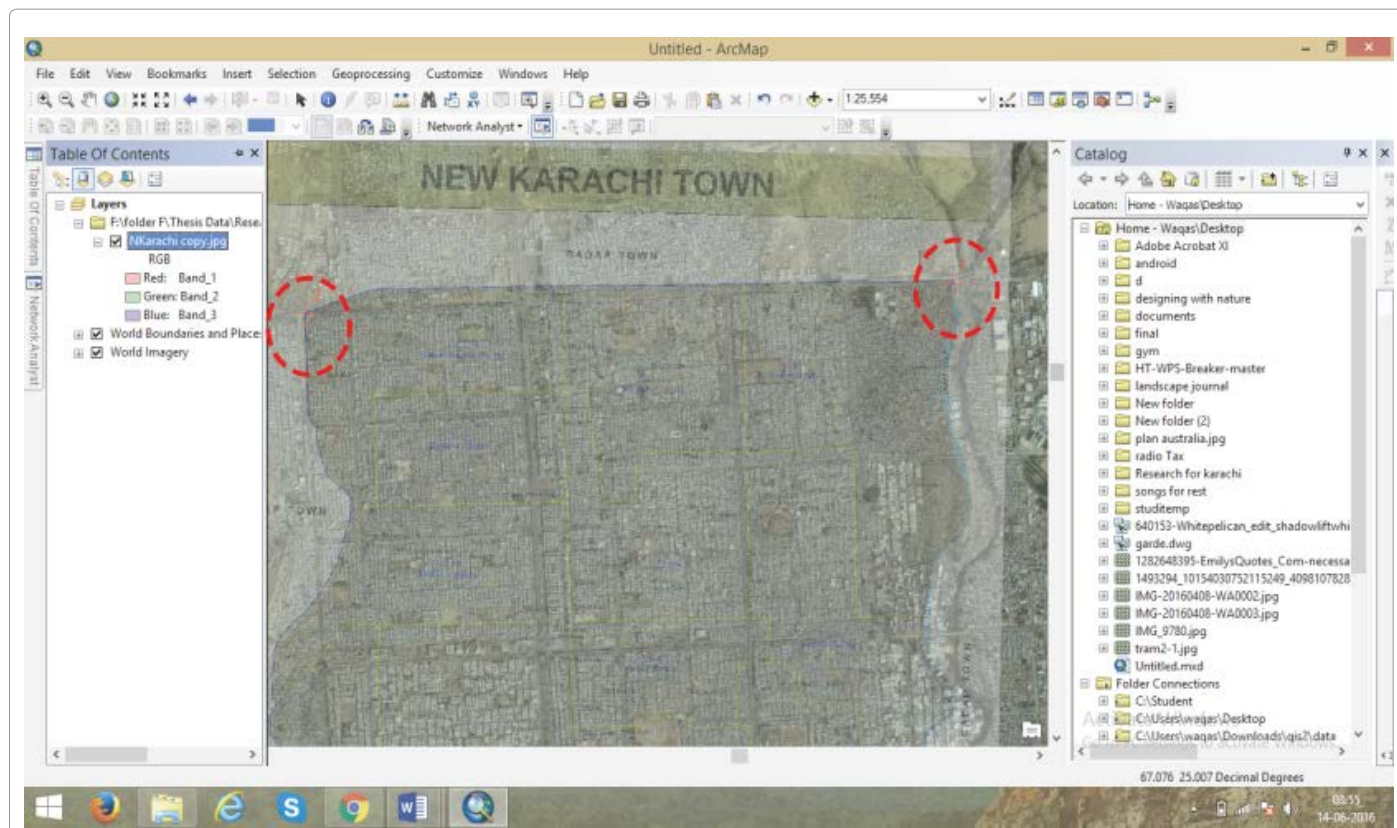


Figure 3: Encircled red dots are the control points for projecting an image through geo referencing on actual coordinate system.

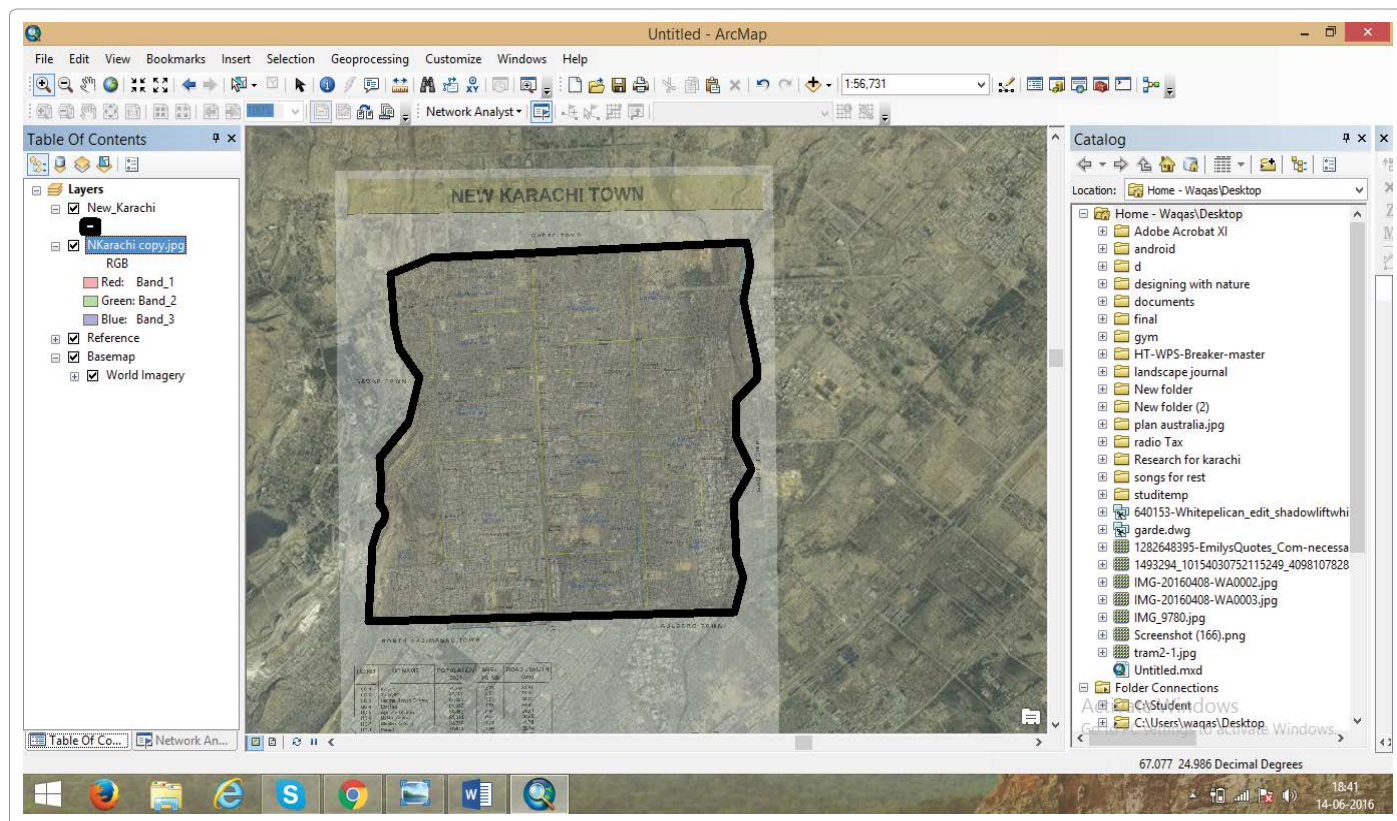


Figure 4: Digitising polygon.

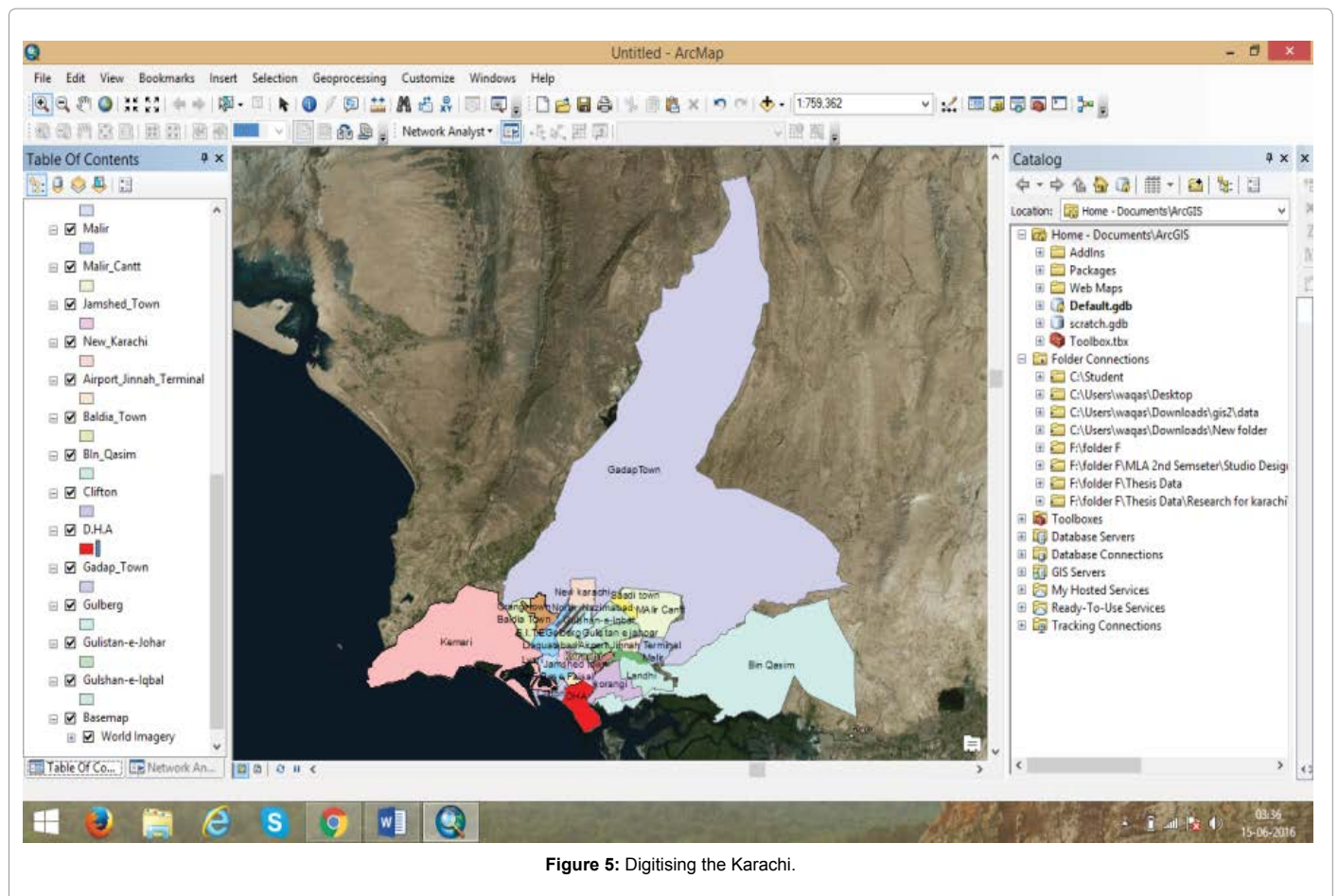


Figure 5: Digitising the Karachi.

### Creating attributes

In attribute table, from shape file, I calculated the areas of polygon in Km<sup>2</sup> and inserted population according to the statistics provided on the website in year 2005 the calculated population of Karachi according to the results were more than 15 million (15637562).

Afterwards through annual percentage growth rate which is 0.05%, I calculated the population of 2016 and predicted the population in 2050. My reference year of population was 2005. This population of 2016 was formulated by

$$[\text{Population}]^{(11 \cdot 0.05)} + [\text{Population } 1]$$

Whereas population is a population of 2005, 11 is the difference of years since 2016 to 2005, and 0.05 is annual percentage growth, and population 1 is the population of 2005 [14-16].

Same procedure applies for the population growth rate in year 2050.

$$[\text{Population}]^{(45 \cdot 0.05)} + [\text{Population}]$$

The whole argument is for awareness, as population is rising rapidly due to so many reason in Karachi. But land is fixed, intangible which needs consideration of policies in every aspect of life (Figure 6).

### Using ArcScene

Arc scene is capable to show results in 3D (three dimensional). I used ArcScene for my final evaluation to show which district will

bear the burden of densification with the same intensity of planning. Following three images Figures 7 is the hypothesis of my whole argument increasing population making us prone to more chaos, mismanagement and other social problems however, it can be resolved with the good intentions of policy makers and the state actors.

### Conclusion

By using ArcMap we can resolve much urban agglomeration just by adding more tables of data in attribute tables the whole system can be reformed. As a keynote from this data we can create more datasets out of it. We can control the building planning. Criminal activities, educational problems, Health care facilities, fires stations, infrastructure problems. It can contribute in public policy. All in all with the technology we can contribute in the betterment of society.

On the whole, urban agglomeration is concern of all growing cities, developed countries are equipping their cities with new ideas in sociological and technological aspects, Karachi is one of the mega cities of the world but this orphan city is neglected by the state in all developing affairs as well as in integration of societies. This city is already undergoing from climate changes as in last year 2015 heat wave claims 2000 lives. Heat Island effect is also the cause of these deaths. Whereas in COP21 world vows to maintain the global warming below 2°C and our Prime minster among his entourage attended the conference, Is there in past any initiatives has been made towards “Think globally act locally” from agenda 21. This chaotic urban mismanagement already affected the behaviour of the citizens of Karachi they already became

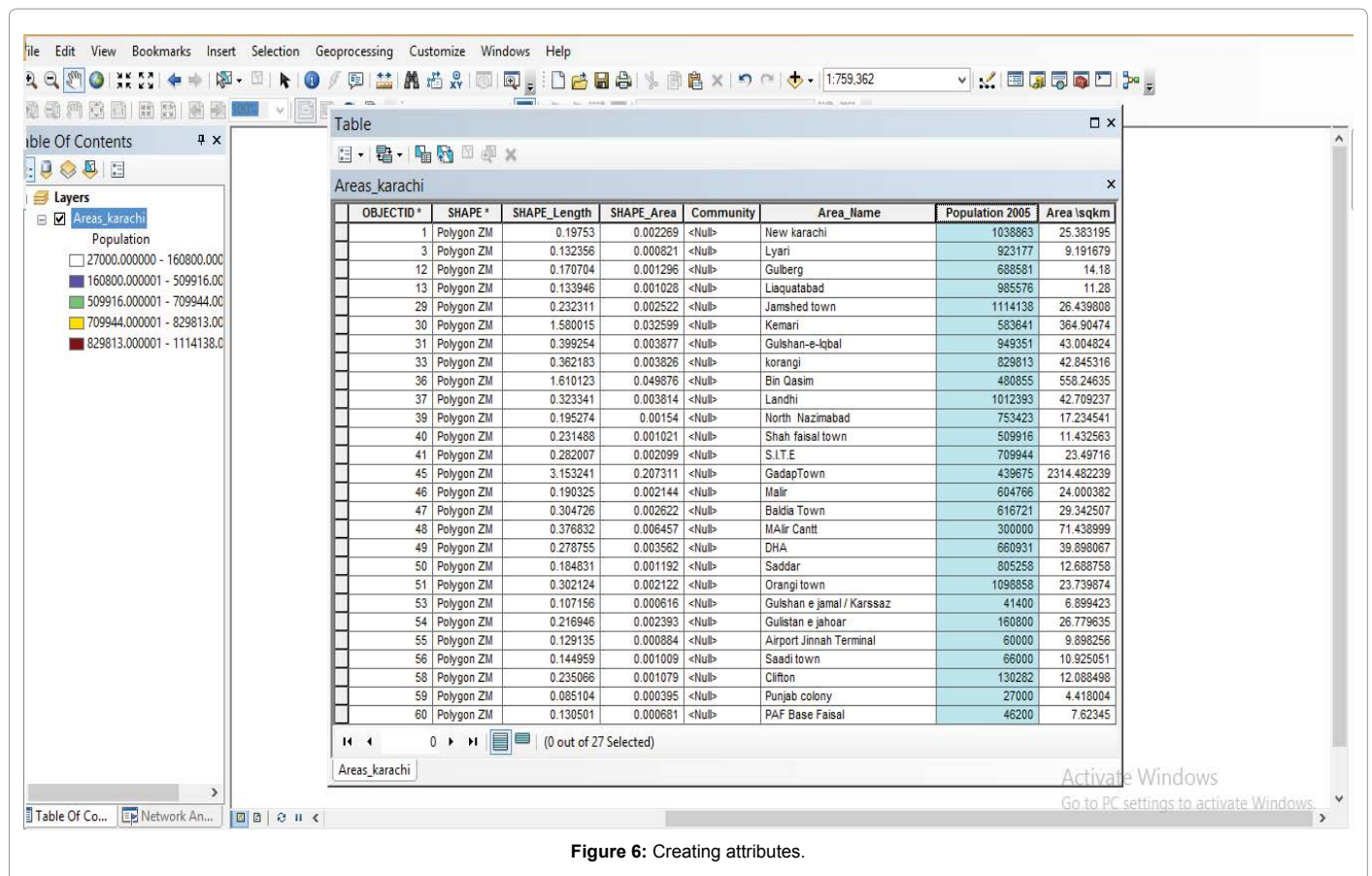


Figure 6: Creating attributes.

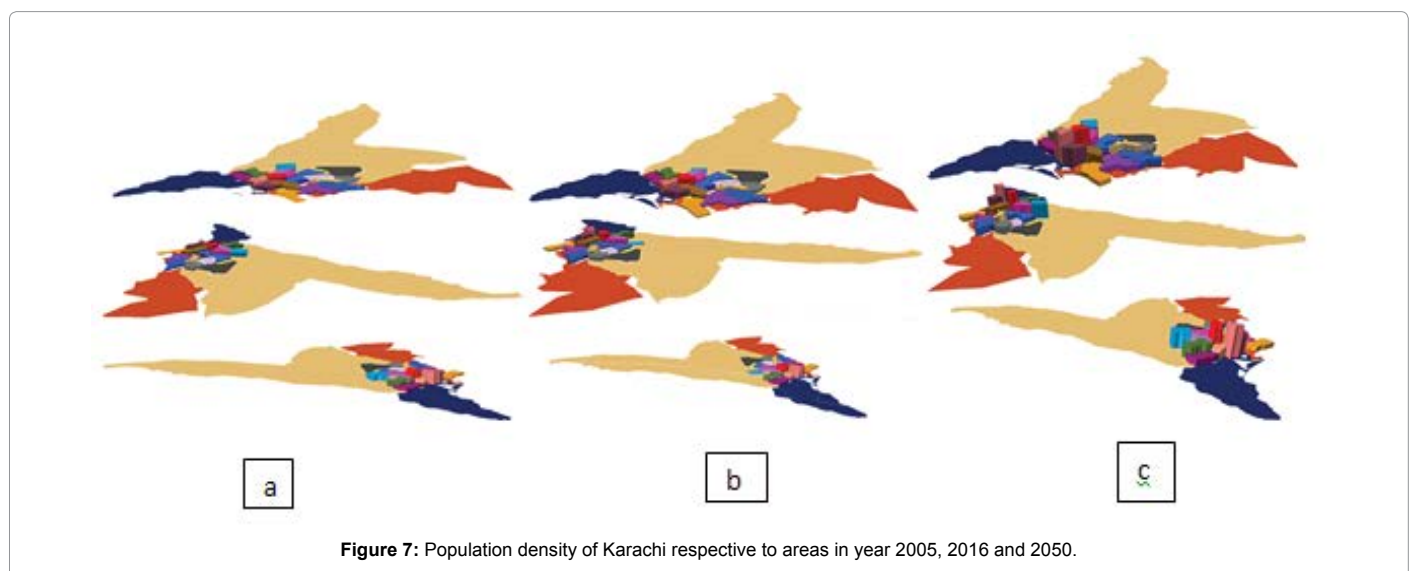


Figure 7: Population density of Karachi respective to areas in year 2005, 2016 and 2050.

intolerant, impolite, depression, frustration can be seen in very social class of the city. Transportation depend upon fossil fuel, disorganized traffic management consuming more energies. How come these efforts would help the world to get the temperature of the our planet earth below 2°C. World Bank or other monetary institutions will definitely help us but due to short sighted vested interest of Politian and state, depriving masses from their basic needs of living. However they have all the state department of relief, planning and what not, but these

department are mere dummies headed by incompetents. I as Karachiites know how much potential, enthusiasm, courage and generous this city is. All it requires to adopt this orphan city by its own inhabitants.

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