

Historical Information System for Surveying Monuments and Spatial Data Modeling for Conservation of Cultural Heritage in Delhi

Madan MOHAN, India

Key Words: Archaeology, Spatial Information, Historical Monument, Cultural Heritage, Integration, Reconstruction and Conservation

SUMMARY

The ancient historical cities and the cultural heritage sites have been engulfed into the concrete jungle of high rise buildings in Delhi. The different infrastructure facilities and opportunities available in Delhi have attracted peoples from all over the country, India. At present, Delhi is a complex agglomeration of built fabric which exists as evidence in the form of layers of various historic time periods. Throughout the history, the Delhi was built and rebuilt seven times on different sites through out the history within a triangular area of about 142.20 sq. kms. lying between the last ridge of the Aravalli Range and the River Yamuna. So, with the fast pace of urbanisation there has been wide spread land use changes which took place from the city centre and to across the River Yamuna and the Northern Ridge during the 20th Century. It has begun to blur the line of distinction between Old and New Delhi. The high rise buildings now stand cheek-by-jowl with Delhi's 1,300 historical monuments. Delhi is one of the ancient historical and greatest cultural cities of the World. Delhi's two monuments the Qutb Minar and Humayun's Tomb have been declared the World Cultural Heritage sites. However, it is noteworthy to mention that the vertical and horizontal expansions have adversely been affected the historical areas as well as several cultural heritage sites particularly during the post-independence period in Delhi. The coexistence of the past and the present at many levels characterises Delhi, as unity in diversity in terms of culture and historicity. Therefore, the widened role is not only to meet the challenges of development, but also to preserve and protect the different facets of the Delhi's historical personality. In lieu of this, the Archaeological Survey of India (ASI) has been started a search for hitherto unknown areas of historical importance on the one hand and is also entrusted with the restoration and conservation of known historical monuments and cultural heritage sites in Delhi on the other.

Historical Information System for Surveying Monuments and Spatial Data Modeling for Conservation of Cultural Heritage in Delhi

Madan MOHAN, India

1. INTRODUCTION

Delhi has rich historicity of the ancient monuments and the cultural heritage sites of the World. On reviewing the magnitude of ancient historical and cultural heritage sites in Delhi, one would find that historically it commenced with the habitation by 736 A.D. Delhi is one of the greatest and oldest capital cities of the World. It is situated on the west bank of the River Yamuna. It was built seven times on different sites throughout the history (Hearn, 1974). The previous seven cities do not exist any more, except as remnants of historical ruins of the Lal-Kot (10th Century), Siri (1303), Tughluqabad (1321), Jahanpanah (1327), Firuzabad (1354), Purana-Qila (1533) and Shahjahanabad (1639). There were many reasons for their demise range speculatively from lack of sufficient water, to epidemics, to migrations, to poor governance and to land encroachment etc. In addition, presently formed New Delhi (1911), of course, is eighth one among the cities of Delhi. Moreover all the ancient cities shifted from one site to another over a time within the triangular area of about 142.20 sq. kms. lying between the last ridge of the Aravalli Range and the River Yamuna to the east. From the earliest records, it is known Indraparastha, the capital of the Pandavas of Mahabharata. Presently, Indraparastha estate evokes the old memories. The British built New Delhi south of Shahjahanabad, and shifted the capital city from Kolkota (Calcutta) in 1911. The capital city of India, after independence, has grown in size and density, therefore, engulfing all the ancient cities, and overflowing across the River Yamuna and the Northern Ridge. According to the urban sociologists and historians (Mumford, 1966) all cities are “living entities”, which go through a life-cycle as the birth, growth, consolidation, expansion, decline, and quite often some kind of end, or state of decay, unless they are “turned-around” and “revived” by combined human efforts. However, the remnants and relicts of the ancient building structures along with all the seven historical cities built during the 10th Century to 17th Century, now stands as the historical monuments in Delhi.

The significance of the Delhi's historical monuments was routinely mentioned in heavy words in the Master Plans of Delhi as the MPD-1962, MPD-2001 and MPD-2021. Delhi's Population has grown from 0.41 million persons in 1901 to 13.78 million persons in 2001. So, there was an addition of about 13.37 million persons during the entire 20th Century. Besides this, the Delhi has recorded the highest density of population of 9,294 persons per sq. kms. among the states during 2001 in India (Census, 2001). It is significant to point out that ever since 1911; the Delhi's population is continuously growing and engulfing all the ancient historical monuments and archaeologically and culturally significant sites. Consequently, the Delhi has more layers of culture, civilisation, history and built fabric extant in it than any other city in the World. It cradled and nurtured seven cities, and was built and rebuilt to meet the demands of different emperors and the people of each of those times. It is the enthralling

and enigmatic feature of this ancient modern city, that Delhi today, is a complex agglomeration of built fabric which exists as evidence in the form of layers of various historic time periods. These layers can be easily distinguished on the basis of their design, construction techniques, materials and architectural elements that add diversity to the basic typology. These range from domes, brackets, chhajjas, columns, plinths, finishes, etc. Therefore, the Archaeological Survey of India has been entrusted with the preservation and protection of known monuments, in order to protect ancient historical monuments and the cultural heritage of Delhi, started a search for hitherto unknown areas of historical importance.

2. OBJECTIVES

The main objectives of the study were as follows:

- to illustrate the historicity of existing ancient historical cities and monuments;
- to examine the impact of urbanisation on historical and cultural heritage sites; and
- to suggest the suitable strategies for conservation of historical monuments and cultural heritage sites

3. DATABASE AND METHODOLOGY

This study is based on the primary as well as the secondary sources of historical data and available relevant literature which were collected specifically to attain the objectives set for this study. As the ancient historical data have been collected from the Gazetteers of India. In addition to this, the historical monuments data have been collected from the different volumes and reports of the Archaeological Survey of India. A number of physical observations have also been made during the field survey for the ancient cities and historical monuments such as the landscape's physiological destruction, illegal land encroachment and shrinkage of open spaces around them and occupancy of land etc. Such observations have been recorded through the photographic media and then compiled into the attribute info tables. Thus, the present study has been supported by the primary and secondary sources of data generated through the extensive field and literature surveys of the records of Archaeological Survey of India, Land and Development, Department of Urban Development Ministry, Revenue Department, Forest Department and Delhi Development Authority, etc. for the Delhi State. Besides this, the spatial historical data mapping and modeling has been accomplished through the GIS software's like the Arc/Info, ArcView and GeoMedia. These tools are more effective for historical information analysis, integration and presentation of the spatial and non-spatial data. Finally, the spatial historical information of the archaeological sites has been compiled systematically which is highly useful for restoration and conservation of the cultural heritage sites of Delhi.

4. HISTORICAL SURVEY OF ANCIENT MONUMENTS

The ancient cities and historical monuments are still found existing in different parts of the Delhi. All these historical monuments are the remanents and relicts of the ancient seven cities

and ancient building structures in Delhi. So, these historical monuments restoration and conservation are the main concerning issues of the present. It is really a daunting task to survey and gather info for all these historical monuments. However, while keeping in view the time and available resources, the well known ancient seven cities and historical monuments have been taken into consideration and are covered in the present study. Therefore, this study is primarily concerned with the historical ancient seven cities, historical ancient forts, historical ancient and modern monuments along with the World's cultural heritage sites in Delhi.

4.1 Historical Ancient Cities

The remnants and relicts of the seven cities of Delhi can still be seen across the landscape from the Tomar city of Lal-Kot to Siri, Tughluqabad, Jahanpanah and Firuzabad of the Sultans and then Purana-Qila and Shahjahanabad of the Mughals. Moreover, the New Delhi is historically the 'eighth city' built by the Britishers. Delhi is one of the most ancient and historic cities of the World. The earliest reference to its settlement is to be found in the famous epic 'Mahabharata' which mentions about the city called Indraparastha built along the bank of the River Yamuna. The first medieval city of Delhi believed to have been founded by the Tomars, the Tunvar Rajputs in 736 A.D. It was called Dilli or Dhillika (Chopra, 1976; IGOI, 1989). Evidently, Delhi was an important town, and perhaps also the capital of Haryana. The name 'Delhi' is derived from the legend of Raja 'Dillu' who is believed to have founded Delhi near the Qutb Minar. Its roots can be traced to the era of the Pandavas, when Mai Danav built the capital of Indraparastha. Since then, this site has been the capital of many kingdoms. Many cities have risen and fallen here as is clearly evidenced by the Table 1 and 2 and the Figure 1 and 2.

City Order	City Name	Year Estb.	Founder
I	Lal-Kot	1000	Anagpal
II	Siri	1303	Alau'd-Din Khilji
III	Tughluqabad	1321	Ghiyathu'd-Din Tughluq
IV	Jahanpanah	1327	Muhammad-bin Tughluq
V	Firuzabad	1354	Firuz Shah Tughluq
VI	Purana-Qila	1533	Humayun
VII	Shahjahanabad	1639	Shah Jahan
VIII	New Delhi	1911	Britishers

Table 1. Historical ancient cities of Delhi

City Order	City Name	Area Kms ²	Dist. from Qutb(Kms)	Real World Coordinates	
				Long.(D:M:S)	Latit.(D:M:S)
I	Lal-Kot	3.40	0.00	77:10:58.799	28:31:51.817
II	Siri	1.70	4.40	77:13:00.306	28:34:21.913
III	Tughluqabad	2.20	7.70	77:15:37.550	28:31:33.227
IV	Jahanpanah	0.20	4.40	77:14:04.633	28:33:17.586
V	Firuzabad	0.10	13.10	77:14:18.928	28:39:07.811
VI	Purana-Qila	0.20	10.70	77:14:26.075	28:36:44.862
VII	Shahjahanabad	4.90	14.80	77:13:00.306	28:42:22.792
VIII	New Delhi	12.20	10.50	77:12:38.864	28:37:13.452

Table 2. Spatial data for historical cities

Archaeologists also claim that Delhi was a famous capital even before the reign of Alexander the Great in the 4th Century B.C. Delhi as a place name seems to have been referred to, for the first time, during the First and Second Centuries A.D. Ptolemy, the celebrated Alexandrine Geographer, who visited India during Second Century A.D., had marked in his map 'Daidala' close to Indraparastha and in between Mathura and Thanesar (Spear, 1945).

So, as regards origin of the name, Delhi derived its name from Raja Dillu or Dhillu. The name of Delhi seems to have been finally evolved from Daidala, Dhillika and Delhi. The modern name Delhi is derived from Dihli or Dilli, the Hindi equivalent of Dhilli of the inscriptions. To read in it Dehali, the Hindi word for 'threshold', and to assert that Delhi signifies the threshold of the country, is only fanciful. However, there are various views as to how Delhi, the capital of India derived its name. It may have come from Raja Dillu's Dilli (1st Century B.C.) which was sited just east of Lal-Kot or from Dhilba founded by the Tomar Rajputs in 736 A.D. And some say it came from the medieval town of Dhillika located near present date Mehrauli.

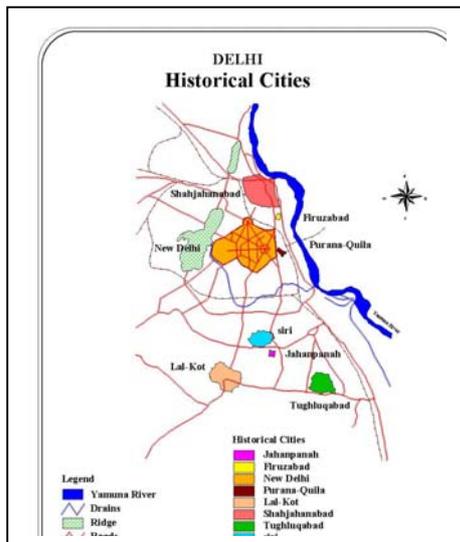


Figure 1. Historical ancient cities

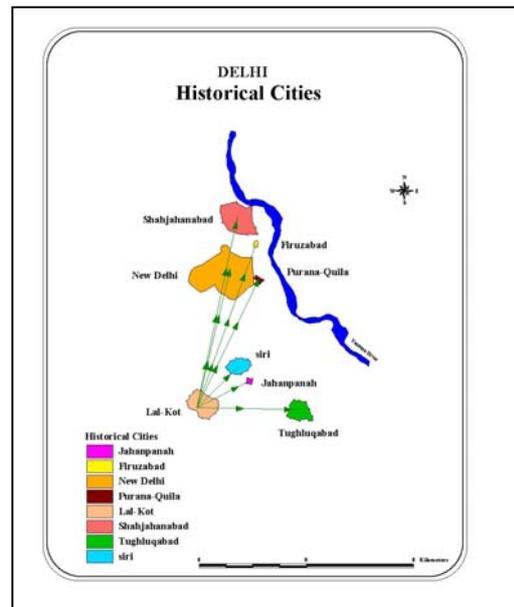


Figure 2. Cities location from Qutb

4.2 Historical Ancient Forts

The Siri Fort foundation was laid by the Sultan Alau'd-Din Khilji in 1303. It was the first city to be originally built by the Muslims. It is laying spread over an area of about 1.70 sq. kms. It is situated about 4.40 kms. in the north-east of the Qutb Minar. Siri was a circular city. In other words, its rubble-built high city-wall is roughly oval on plan. It is noteworthy to mention that some derelict structures in the village of Shahpur Jat still stands on the west as is shown in the Figure 3. Alau'd-Din Khilji had also built the magnificent great royal tank called the Hauz Khas, for providing water to the Siri Fort as is shown in the Figure 4.

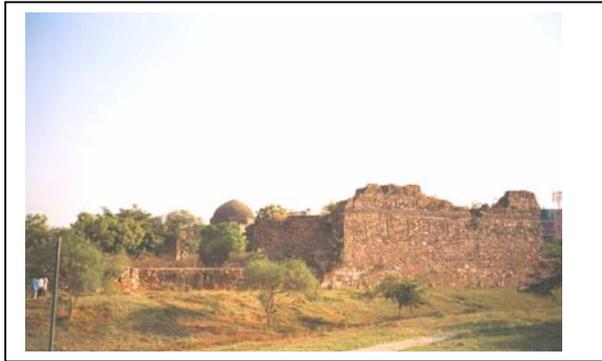


Figure 3. Relict wall of Siri Fort



Figure 4. Hauz-i-Ala'i at Hauz Khas

It was originally known as Hauz-i-Ala'i. At that time it had enough water to meet the needs of the city. However, at present, the fort is a mass of ruins. It is represented now only by stretches of its thick stone walls provided with 'flame-shaped' battlements which appeared here for the first time. The site of this fort is partially occupied by the village of Shahpur Jat. At present, Siri Fort is situated where the modern day Asiad Village Complex are located.

The Old Fort meaning 'Purana-Qila' construction was begun in 1533 by Humayun (1530-40 and 1555-56). It is located in the north about 10.70 kms. away from the Qutb Minar. Old Fort stands on the site that is believed to be Indraparastha, the capital of the Pandavas in the Mahabharata epic. Through the evacuation from the Purana-Qila evidences have been turned up and collected pieces of the painted grey ware, relics and remains of later periods through the Archeological Surveys. Such characteristics of wares had been associated with the Mahabharata epic which had been dated to around 1000 B.C. However, its occurrence here seems to support the tradition of Purana-Qila being the site of Indraparastha which was the capital of the Pandavas, heroes of the Mahabharata, originally situated on the bank of the River Yamuna (Sharma, 2001). It was completed within the short period of ten months. Later on, Sher Shah Suri (1538-45) demolished the Old Fort and on the same site raised his citadel. He completed the fortress palace in 1545. Its ramparts spread over an area of nearly 0.20 sq. kms. It has three main gates which were double-storied, built with red sand stone and surmounted by canopies (chhatris) as is clearly evidenced by the Figures 5 and 6. Among the three main gates, the northern gate is called the Talaqi-Darwaza meaning 'Forbidden Gate'. The southern gate is known as the Humayun-Darwaza. The eastern side was having a 'Water Gate'. It is believed that Sher Shah Suri left the Purana-Qila unfinished and it was completed by Humayun. The Sher-Mondal in Purana-Qila is believed to have been used by Humayun as his Library.

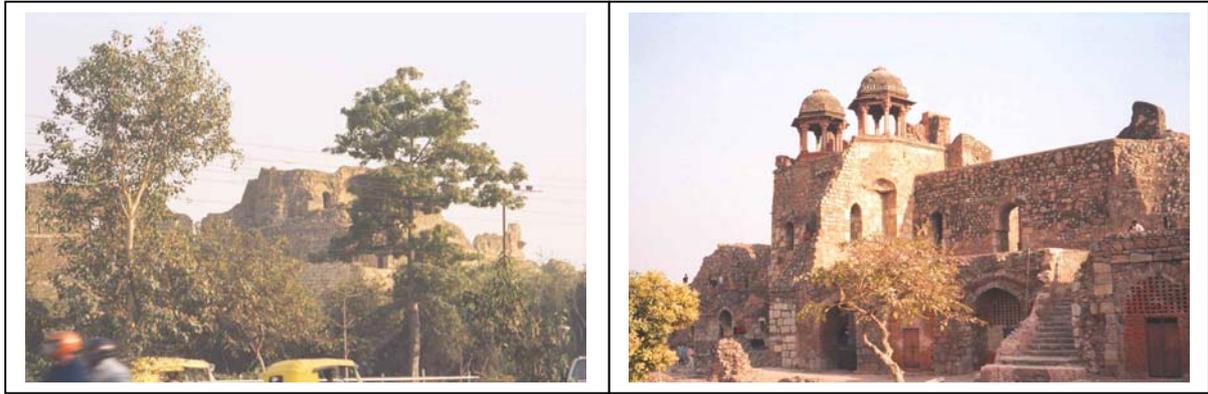


Figure 5 & 6. Relict walls of Old Fort

Red Fort meaning ‘Lal-Qila’ as a colossal structure of red sandstone as is shown in the Figure 7, was built by Shah Jahan in 1639 and 1649, was the seat of Mughal power till the last emperor was dethroned. Built in red sand stone, this imposing fort is 3 kms. in perimeter with the height of the wall varying from 18 to 30 meters at places. Inside the fort are majestic audience halls which once were decorated with the diamond-and-ruby studded Peacock Throne, the pearl mosque and marble palaces. When the Red Fort was being built River Yamuna used to flow on its one sides and there were deep moats on the other.

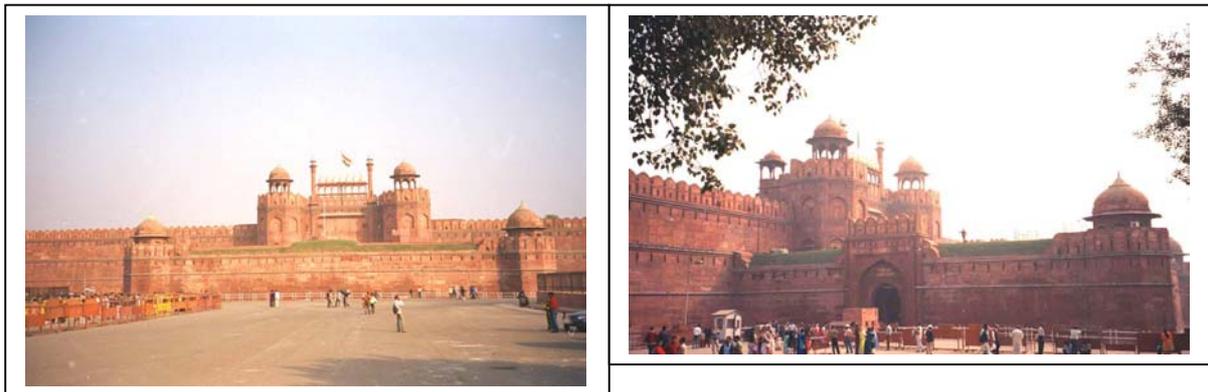


Figure 7 & 8. Red Fort and its Lahori Gate

At present, the River Yamuna flows almost a kilometer away from the fort and the moats has dried up. In the evening the Delhi Tourism organises an evening light-and-sound show which narrates the history of Delhi in context of the Red Fort. It is an irregular octagon with two long sides on the east and west. It has two main gates, the Lahori Gate on the west as is shown in the Figure 8 and the Delhi Gate on the south. The Red fort is one among the important architectural gifts of the Shah Jahan to Delhi (Stephen, 1876). Shah Jahan himself had planned the Red Fort. Because of his architectural and artistic glories his fame spread throughout the World.

4.3 Historical Ancient Monuments

Jama Masjid was built in 1656 by Emperor Shah Jahan is the largest and most splendid mosque in India. With three majestic black and white marble domes covering the prayer hall, it can seat 20,000 people. This is one among the most important architectural gifts of the Shah Jahan to Delhi (Fanshawe, 1902) as is shown in the Figure 9. Shah Jahan also built the World famous Taj Mahal at Agra.



Figure 9 & 10. Jama Masjid and Safdarjung Tomb

Safdarjung Tomb as shown in the Figure 10 is situated besides the Safdarjung Airport. This tomb was built in 1754 for the prime minister of Emperor Mohammed Shah by the Nawab of Avadh for his father. The tomb structure itself is one of the finest example of architecture with ornate carvings and an imposing Mughal dome of its time and tells a saga of the last remnants of a dying empire.

Bara-Gumbad is situated adjoining to the India International Center. It is a square tomb. It was built during the reign of the Sikandar Lodhi (1489-1517). The Delhi Development Authority developed a Lodhi Garden, around the tombs of Sayid and Lodhi rulers as is shown in the Figure 11. This garden is very well planned and has artificial streams. The Tombs of the rulers adorn the architectural style as the arches and bracket-and-lintal beams are both used as spans here.

Chandni Chowk is one of the main markets of Delhi as is shown in Figure 12. Chandni Chowk was once lined with beautiful fountains. But today the place is very crowded and congested. Chandni Chowk is located opposite the Red Fort. On one end of Chandni Chowk is the Fatehpuri Mosque which was erected by the wives of Shah Jahan. Opposite the Kotwali (Police Station) is the Sunheri Masjid from where Nadir Shah ordered his troops to plunder and massacre Delhi. Chandni Chowk is also one among the most important architectural gifts of Shah Jahan to Delhi.

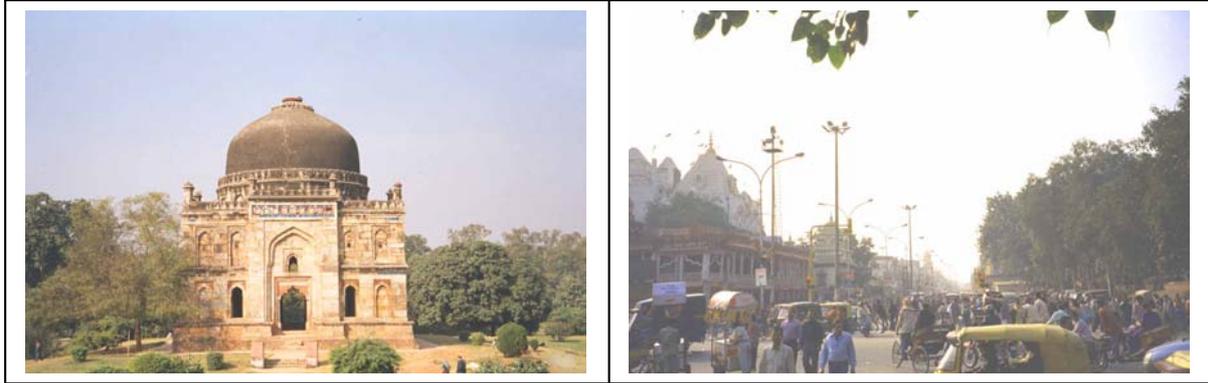


Figure 11 & 12: Bara-gumbad and Chandni Chowk

Jantar Mantar is located at a few minutes walk distance from Connaught Circus is a strange collection of Solomon coloured structures. This is actually an astronomical observatory which was built by Swai Maharaja Jai Singh II of Jaipur in about 1724. Samrat Yantra the largest structure is a gigantic sundial. The other five instruments plot the course of the planets and predict eclipses. The Misra-Yantra (mixed instrument) is located to the north-west as is shown in the Figure 13. It is consisted by the four instruments in one. These are the Niyata-Chakra, Equinoctial Dial, Dakshinottara-bhitti-Yantra and Karka-rasi-valaya. The instruments are built with brick rubble and plastered with lime.



Figure 13: Misra-Yantra

4.4 World's Cultural Heritage Sites

Humayun's Tomb was built by the wife of Humayun, Bega Begum in the mid 16th Century (1565) as is shown in the Figure 14. This red and white sand stone structure is considered to be the predecessor of Taj Mahal. The structure is an elegant example of early Mughal Architecture. Each side is dominated by three emphatic arches in which the central arc being the highest. The tomb's roof is surmounted by 42.50 metres high double dome of marble with pillared kiosks (chhatris) placed around it. The tomb enclosed by the two lofty double-storied gateways located on the west and south.

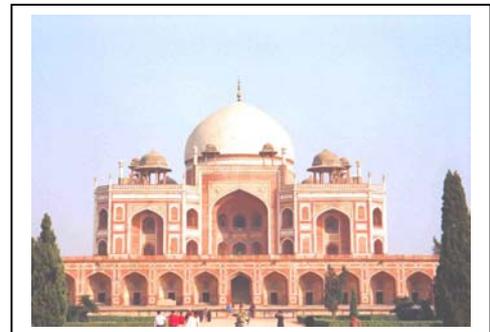


Figure 14: Humayun's Tomb

The World famous Qutb Minar's foundation was laid by the Qutbu'd-Din Aibak in the final year of the Twelfth Century (1199). He had perhaps only succeeded in raising the first story of the Qutb Minar. It was completed by Qutbu'd-Din's successor and son-in-law, Shamsu'd-Din Iltutmish (1211-36). Possibly raised both as a tower of victory and as a minar attached to the Quwwat-ul-Islam mosque for the use of the mu'adhdhin to call the people for prayer. The original three stories of the Qutb-Minar are each laid on different architectural plans as is evidenced by the Figure 15. The ground story was built with alternate angular and circular flutings. The second story was constructed with round ones and the third with angular ones only, with the same alignment of flutings, however, being carried through them all. The Qutb Minar has five distinct stories each one is having projective balconies with stalactite pendentive type of brackets and inscriptional decorative bands heighten its decorative effect. It was damaged by lightning in the years 1326 and 1366. Firoz Shah Tughlaq repaired the damage and added the fifth storey. The base of the Qutb Minar is 14.32 metres in diameter. And it tapers to top to 2.75 metres diameter at a height of 72.50 metres high. It is still the highest and finest stone minar in India. It is also one of the finest Islamic structures ever raised and the Delhi's recognised landmark.

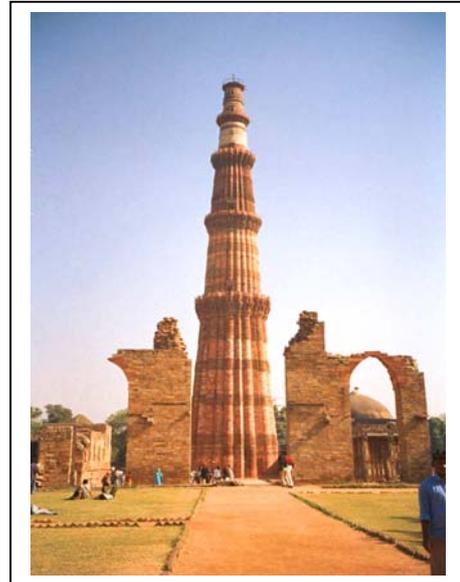


Figure 15: Qutb Minar

4.5 Historical Modern Monuments

India Gate is 42 metres high war memorial stone arch of triumph as is shown in the Figure 16. It was built in honour of 90,000 Indian soldiers who lost their lives in World War I, the North-West Frontiers operations and the 1919 Afghan Flasco. Below the arc is the memorial to the unknown soldiers where it burns the Amar Jawan Joyti, the eternal flame in tribute to all martyred soldiers of India. India Gate is surrounded by green grass lawns and trees.

Rashtrapati Bhavan, as is shown in Figure 17 was designed by Sir Edwin Lutyens and Sir Herbert Backer (Spear, 1945). It is the official residence of the President of India. It is an imposing structure with 340 rooms, constructed high up on Raisna Hill. On its either side, are the impressive office buildings as the North Block and South Block. The Moghul garden is located in the premises of the President House. During the spring seasons of February and March, the garden is in full bloom. This garden has some exotic and rare flower plants. The dwarf orange trees and numerous rose plants are special attraction in the garden. The fountains add to the beauty of the palace.

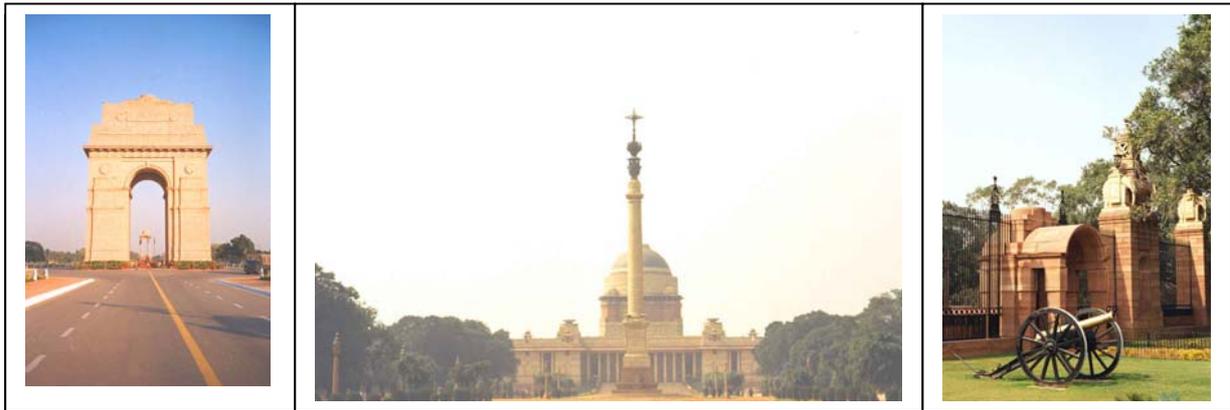


Figure 16, 17 & 18: India Gate, Rashtrapati Bhavan and its entrance gate

5. URBANISATION IMPACT ON HISTORICAL MONUMENTS

Urbanisation is the process of transformation of rural areas into urban areas due to industrialisation and economic development. The processes of urbanisation and economic development are interrelated to each other (Breese, 1978). Until 1911, Delhi was a regional town. Later on, in 1911 it became the capital city of the country, India which was established to the south of Shahjahnabad city. The concentration of population in Delhi started to increase with the foundation of New Delhi by the Britishers. During the colonial period (British rule), the population of Delhi during first sixty-two years from 1803 to 1865, has quite naturally increased from 1.50 to 3.30 lakhs persons respectively. In 1803, the Delhi was declared a province for the purpose of administration that is why the peace and order returned there, which was responsible for the increase in population. Thereafter, a period of political uncertainty such as the 1857 rebellion against British, prevailed which resulted a considerable decrease in population. Later on, the Delhi's population started to increase from 1.73 lakhs in 1881 to 1.93 lakhs in 1891. Furthermore, the population has grown to 4.06 lakhs in 1901. Whereas, there was not much change in Delhi's urban population during 1901-11 as it grew by just 11.13 per cent as is evidenced by the Figure 19. The decade 1911-21 witnessed an increase by 27.94 per cent. This increase may be mainly attributed to the shifting of capital from Kolkota (Calcutta) to Delhi in 1911. The growth of urban population during 1921-31 and 1931-41 was 46.98 per cent and 55.48 per cent respectively. So, before 1931, urbanisation progressed in the northern and western parts of the walled city Delhi. The Figure 19 and 20 reveals many facts regarding the urban population growth and trends of urbanization for Delhi, which portrays a rising trend all through during 1901- 51.

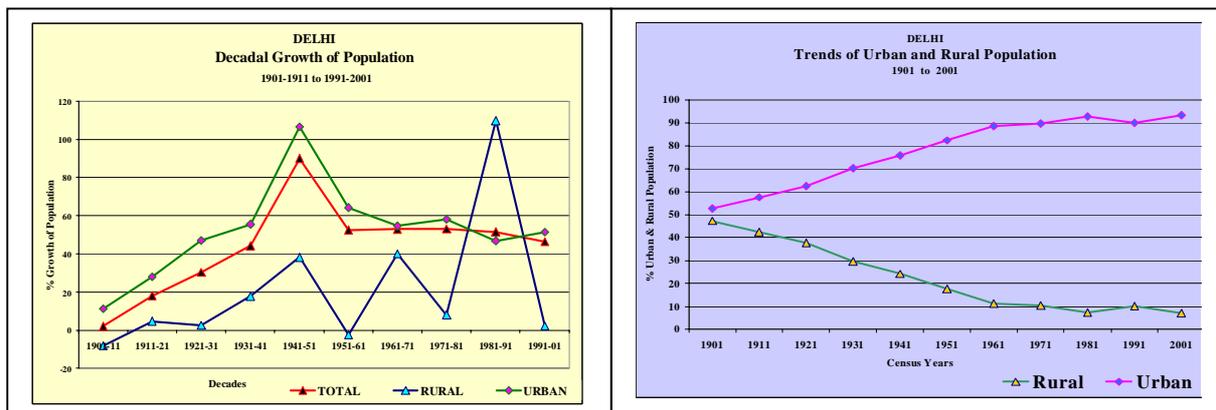


Figure 19 & 20: Population growth and process of urbanisation

The scenario of urbanisation took a great turn during the post-independence periods. The urban population started to grow from 1.44 million persons in 1951 to 8.47 million persons in 1991. Thereafter a sudden upsurge occurred in the urban population as it was grown to 12.82 million persons in 2001. Whereas the urban growth almost double to 106.58 per cent during 1941-51 in comparison to the previous 1931-41 period which recorded urban growth of 55.48 per cent. The partitioning of the country resulted in huge influx of displaced persons in the urban areas. Thereafter during 1951-61, the urban growth rate fell to 64.17 per cent. During the next period 1961-71, it again showed ascending trend, although marginally as is clearly evidenced by the Figure 19. Such declining tendency in urban population growth rate in Delhi was due to the multiplication and intensification of services during the post-independence era in the rural-urban fringe of National Capital Region (NCR) of Delhi. So, such decentralisation of services and industries towards the fringing areas of the Delhi was responsible to some extent the dispersion of urban population. Later on, the main factors responsible for unabated growth of urban population in the Delhi are the expansion of commerce and trade; and the growing industrialisation, particularly, in the field of small-scale industries up to the 1971-81 decade (Mohan, 2003). During 1981-1991 period, the growth rate of urban population was 46.87 per cent. Such decline in population growth was resultant due to high growth of rural population of 109.86 per cent during the same period as is evidenced by the Figure 19. Later on, the rural population highly declined to 2.13 per cent on the one hand and urban population growth increased to 51.36 per cent on the other hand during 1991-2001 as is shown in the Figure 20. However, it is noteworthy to point out that Delhi had almost an equal distribution of population in the rural and urban areas in 1901; but gradually it was continuously decreased over the periods of time till 2001 as is evidenced by the Figure 20. Whereas the spatial patterns of population growth, density and levels of urbanisation for Delhi is shown in the Figures 21, 22 and 23. The coexistence of the past and the present at many levels characterises Delhi, as it does India. The assimilation of a specific cultural influence is expressed differently by people living in different parts of the city, a fact which offers insights into the social strata (Wirth, 1938; Robson, 1994 and Bradford, 2003).

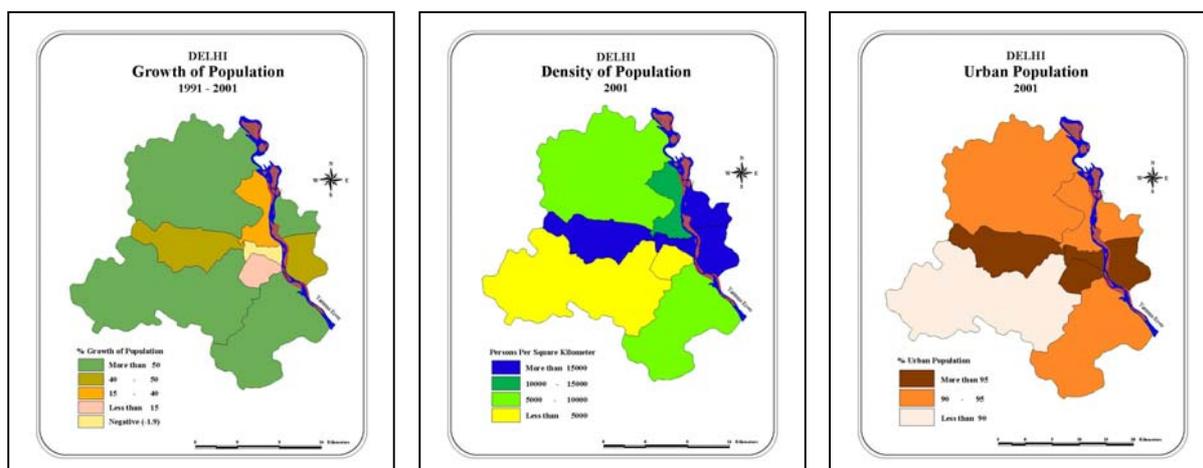


Figure 21, 22 & 23: Population Growth, Density and Urbanisation

Industrialists, entrepreneurs and migrant labourers from all over the country have turned to Delhi in search of livelihood and success, and made it a commercial capital as well. The cultivated fields which till recently could be seen on the outskirts of the city have been developed into residential colonies and commercial complexes. High-rise buildings now stand cheek-by-jowl with Delhi's 1,300 monuments (Sharma, 2001). Villages such as Khirkee, Begumpur, Hauz Khas, Sheikh Sarai and Nizamuddin which grew around medieval Delhi's shifting capital cities have now been engulfed by the urban sprawl. Many of them, however, retain their old-World characteristics. The facilities and opportunities available in Delhi have attracted peoples from far-flung corners of the country, making it a melting pot of sorts.

6. CONSERVATION OF CULTURAL HERITAGE SITES

Due to fast urban sprawls and land use changes, most of the cultural heritage sites are almost endangered by such changes in Delhi. The land-environment is under stress due to the fast pace of urbanisation. Delhi, however, is known as one of the most fascinating modern city with the World renowned ancient architectural and cultural heritage sites. For instance, the Qutb Minar and Humayun's Tomb have been declared the World Cultural Heritage sites in Delhi. Likewise large portions have been well earmarked as archeological sites. Because the rulers of successive dynasties between 10th and 17th Centuries established seven cities in different parts of Delhi. It serves as a perfect introduction to the cultural wealth, the complexities and the dynamism of India. However, the two most important government organisations, the Archeological Survey of India (ASI) and the Delhi Development Authority (DDA) have taken initiatives in the direction to restore and conserve the historical ancient cities and monuments of Delhi.

The significance of the Delhi's historical monuments was routinely mentioned in heavy words in the Master Plans of Delhi as the MPD-1962, MPD-2001 and MPD-2021. The

National Capital Region Planning Board (NCRPB) and the Delhi Development Authority (DDA) have prepared the NCR Plan and Master Plan for the National Capital Territory of Delhi (NCTD), respectively, with a 20-years perspective showing broad land-use categories and traffic corridors. Both plans could not achieve the desired results because of the lack of clear policies and strategies and also because of poor implementation and monitoring. Recent studies supported by the World Bank have proposed a long-term strategy for urban development planning of NCT Delhi by adopting a comprehensive approach in the context of National Capital Region planning. Such a comprehensive planning approach should first individually address all the important issues such as (a) policies on industrial estates; (b) environmental aspects associated with the relocation of large number of hazardous units; (c) larger housing requirements to accommodate the growing population; (d) slum upgrading at site or shifting of the existing squatter population clusters (now exceeding 1,100 in number); (e) rejuvenation of degraded land as well as preservation of remaining meager forests; (f) enlarging green and open areas following modern urban development codes; and (g) protection of monuments and cultural heritage buildings. After addressing each such issue in its proper perspective, a comprehensive integrated policy on all future land-use norms should be evolved. However, the fast pace of urbanisation has engulfed all the ancient cities and overflows across the River Yamuna and the Northern Ridge. Sustainable urban development is the most important concern to the current urban environmental crisis for restoration and conservation of historical monuments and cultural heritage sites in Delhi. Because Delhi lacks an integrated spatial information system with the relevant databases. Such system can be useful for carrying out archaeological surveys of all the historical monuments and also to evaluate the effectiveness of the conservation actions. Until such knowledge gaps are plugged, the action plans to ensure a sustainable urban development and historical monuments conservation cannot be initiated in Delhi. In lieu of this, the utmost priority is to restore the crowning glory of the ancient past and to conserve the remnants and relicts of the cultural heritage sites through involvement of the government and non-governmental organisation as well as the common peoples of Delhi.

7. CONCLUSIONS

Delhi is one of the most historic capitals in the World. Delhi was built and rebuilt seven times on different sites throughout the history. There are two historical monuments as the Qutb Minar and Humayun's Tomb which have been declared the World Cultural Heritage Sites in Delhi. It is also one of the greenest capitals of the country. For the visitors, it serves as a perfect introduction to the cultural wealth, the complexities and dynamism of India. The fast pace of urbanisation has engulfed all the ancient seven cities and the several historical monuments and then overflows across the River Yamuna and the Northern Ridge. Sustainable urban development is the most important concern of the present for conservation of the historical monuments in Delhi. In lieu of this, there is a need of an integrated spatial information system and a relevant historical monuments and cultural heritage sites database creation in order to effectively implement plans and policies of restoration and conservation of the archaeological significant sites. The Delhi Development Authority (DDA) has been playing an important role in the restoration and preservation of the number of historical

monuments in Delhi. Whereas the Archaeological Survey of India (ASI) involved in evacuation of historical monuments is an important milestone in the restoration process and their historical database generation, based on which sound decisions can be made for conservation of the Delhi's crowning ancient glory.

REFERENCES

- Bradford, Michael (2003) "Regenerating the city and the discipline", *Geography: An International Journal*, Vol. 88, No. 1, pp. 15-22.
- Breese, Gerald (1978) *Urbanisation in Newly Developing Countries*, New Delhi, Prentice-Hall of India Pvt. Ltd.
- Census, India (2001) *Provisional Population Totals – Delhi*, Paper 2 of 2001, Series-8, Rural-Urban Distribution of Population, Registrar General of India, New Delhi.
- Chpora, Prabha (1976) *Delhi Gazetteer*, Delhi, Delhi Administration, pp. 41-116.
- Fanshawe, H.C. (1902) *Delhi Past and Present*, London.
- Hearn, G.R. (1974) *The Seven Cities of Delhi*, Delhi, Ram Nath.
- IGOI (1989) *Imperial Gazetteer of India*, Oxford, Clarendon Press, Vol. I, pp. 488-501 and Vol. XI, pp. 223-241.
- Mohan, Madan (2003) "GIS-Based Integrated Approach for Monitoring and Modeling of Hyper-Urbanisation for Sustainable Development in Delhi", in *2nd FIG Regional Conference Proceedings*, Marrakech, Morocco, pp. 1-15.
- Mumford, Louis (1966) *City in History: Its Origins, its Transformation and its Prospects*, Harmondsworth, Penguin.
- Robson, B.T. (1994) "No city, No civilization", *Transaction of the British Geographers*, Vol. 19, pp. 131-141.
- Sharma, Y.D. (2001) *Delhi and its Neighborhood*, New Delhi, Archaeological Survey of India.
- Spear, P. (1945) *Delhi: A Historical Sketch*, Oxford.
- Stephen, Carr (1876) *The Archaeology and Monumental Remains of Delh*, New Delhi, Ashish.
- Wirth, L. (1938) "Urbanisation as a way of life", *American Journal of Sociology*, Vol. 44, pp. 11.

BIOGRAPHICAL NOTES

Madan Mohan

Academic Degrees I graduated in Geography subject from the Delhi University (DU) with the B.A. (Hons.) degree in Geography in the academic year 1985-86. I pursued my career for higher education to earn the professional degrees of the Master of Arts (M.A.) in Geography and the Master of Philosophy (M.Phil.) with specialisation in the field of 'Urbanisation and Economic Development'. The Jawaharlal Nehru University (JNU) awarded M.A. and M.Phil. degrees to me in the academic year 1987-88 and 1989-90 respectively. The degree of Doctor of Philosophy

(Ph.D.) in the field of 'Ecology and Development' has awarded to me in the academic year 1997-98 by the Jawaharlal Nehru University, New Delhi.

Awards and Honors: I had qualified the National Entrance Test (NET) in the Human Geography subject for the award of Junior/Senior Research Fellowships (JRF/SRF) and eligibility for lecturership by the University Grants Commission (UGC), New Delhi.

Academic Positions held: Since the last three academic years i.e. the 24th October, 2000 to date I am working permanently as a Lecturer in Geography in the Department of Geography, Faculty of Natural Sciences, Jamia Millia Islamia (Central University), New Delhi. Earlier, during the periods 25th March, 1996 to 23rd October, 2000 worked with the Jawaharlal Nehru University, New Delhi.

Selected Research Publications: I have authored for a book on the theme of 'Ecology and Development', which has published in India in January 2000. I have also contributed by publication of number of research papers, which have been appeared in several reputed journals both at the national and international levels on the issues of Ecology and Development, Climate Change, Spatial Data for Environment Management, and GIS and Remote Sensing Application for Mapping and Modeling of Social Life Styles.

Membership of Professional Societies/Organisations: I am the life member of the two professional societies – the National Association of Geographer, India (NAGI); and the Association of Population Geographers of India (APGI); and the associate member of the Boovigyan Vikas Foundation (Foundation for Earth Sciences Development), New Delhi, India.

Paper Presented in International Congresses/Conferences: I had participated and assisted in organisation of the International Symposium on the theme of 'Population Growth in Developing Countries' held at New Delhi in 1993 in Jawaharlal Nehru University (JNU) in association with the International Geographical Union (IGU), France. In addition to this, I had also participated in the XIXth ISPRS Congress Amsterdam 2000, The Netherlands on the theme of "Geoinformation for All"; the Vth ICORG 2001 International Conference, Hyderabad, India, on the theme of "Spatial Information Technology"; the XXII FIG 2002 International Congress on the theme of "Geomatics and Property Valuation for Global Sustainable Development", Washington, D.C. United States of America; and the FIG Working Week 2003 and 125th Anniversary of FIG Congress, main theme was "Still on the Frontline", Paris, France.

Foreign Travels/Countries Visited: I have travelled and visited to foreign countries as the Royal Netherlands (Holland), Amsterdam in 2000; the United States of America (USA), Washington, D.C. in 2002; and the France, Paris in 2003.

CONTACTS

Madan Mohan

Jamia Millia Islamia (Central University)

Department of Geography, Faculty of Natural Sciences, Jamia Millia Islamia (Central University)

New Delhi

INDIA

Tel. + 91 11 2601 1290, Res: 91+11+2698 1717 Ext. 3310/3312, Off.

Fax + 91 11 2698 0229, Off.

Email: roshnlal@ndb.vsnl.net.in, drmdnmohan@yahoo.com

Website: <http://www.jmi.nic.in>