

People, Transport, and Pollution

A Critique of the Delhi Master Plans

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“The welfare department is trying to build houses at low cost to help poor families. The department of transportation is trying to speed up traffic flow in the city. City officials are concerned with keeping disparate functions separate by means of zoning ordinances. The officials behind the counter are trying to follow rules strictly so that they will not lose their jobs. Houseowners are trying to keep their house in good order. Landlords are trying to make as much money as possible from their rents, and to spend as little as possible to get it. Sierra Club members are trying to make sure that nature is respected in the city . . . One gets confused by the multiplicity of aims, and then, ultimately, the overall growth and construction of the city is not guided by any clear motives - only by a hodgepodge of these many different motives.”

Christopher Alexander, Hajo Neis, Artemis Anninou, and Ingrid King in “A New Theory Of Urban Design”

Understanding Planning

City planners plan cities, they do not make them. Cities have their own organic logic of growth. Different interests compete with each other to make the city the way they want it to be for their own survival. The more planners begin to understand this, the more they will be able to plan for the city as it is actually growing, rather than for an idealised notion of what the city should be. Those planners who fail to see this central truth eventually end up catering to the needs of those whose interests are most powerful.

Nothing illustrates this better than the history of the city of Delhi, the area where the Pandavas possibly built their Indraprastha on the banks of the Yamuna river. The architect of this capital, the first city planner, was, appropriately enough, a “demon” named Maya.

The Growth of Medieval Delhi

The name of a city may often tell us much about its history. Delhi’s name may have come from Raja Dillu’s Dilli (100 BC), which was sited just east of Lalkot, or from Dhillba founded by the Tomar Rajputs (736 AD). And some say it came from the medieval town of Dhillika located near present day Mehrauli. Clearly the city has an ancient past. Other settlements which have left their imprint on the land are the forts of Qila Lal Kot (1024 AD), built by Anangpal, and Qila Rai Pithora (1170 AD) of Prithviraj Chauhan. Qutb-ud-din Aibak built his citadel and the Qutb Minar in the same area in 1199. All these cities were built on the Kohi (hilly) area in the south where the northern end of the long Aravali ridge intrudes into the Gangetic plain as a series of rocky outcrops (Fig.1). Thus, the town planner of that time was obviously strategically locating for defence, as well as looking for sources of water which could be entrapped.

It was in 1302 that Ala-ud-din Khilji cautiously descended from the Aravali uplands into the more fertile basin to the north and built a new capital at Siri (land under control). But for the water supply to his new city his engineers had to also construct the imaginative Hauz Khas on one of the many streams leading into the Yamuna (Fig.2). Perhaps this city was plagued by problems of defence, because in 1320 Ghiyas-ud-din Tughluq moved back south on to the Kohi and built Tughluqabad with its massive fortifications. However, the Tughluqs had to abandon this fort within five years because of a shortage of water, and Muhammad Shah Tughluq moved back to the area lying between Siri and Rai Pithora, constructed connecting fortifications, and thus built the city of Jahanpanah (asylum of the world) in 1334. His son, Firoz Shah Tughluq, conceived of the idea of diverting the water of the Yamuna into an old bed of the river and bringing it all the way south, irrigating prime agricultural land up to the Sahibi nadi and adding considerably to the revenues of the state. It was perhaps in order to be closer to this productive venture that his planners created Firozabad in the north in a wedge between the river and the Ridge of the Aravalis.

In 1530, Humayun, the second of the Moghuls, built his Deenpanah (Purana Qila), on top of a mound immediately south of Firozabad where the river provided a first line of defence and water was available in wells. The Afghan King, Sher Shah Suri, settled his Dilli next to this fort in 1542. Shahjahan moved further north into the apex of the wedge to build Shahjahanabad between 1638-44 with the Lal Qila, or Red Fort, as its fulcrum and a ring of satellite forts at Tihar, Palam, and Patparganj to protect the trade routes (Fig.3). For water, the city planners constructed a series of tanks and wells and extended the old Tughluq canal all the way into the heart of the city at Chandni Chowk. All these cities felt secure enough not to retreat back into the Kohi but the necessities of defence, trade, revenue, and water kept them located within the strategic basin to the east of the Ridge. These cities had elaborate layouts and considerable engineering but we do not know enough about the principles of city planning in that period. However, much could possibly be interpreted from what remains of the original constructions, particularly in the old city of Shahjahanabad and its surrounding hinterland.

Colonial Delhi

By the end of the eighteenth century the East India Company had begun making its deep inroads into the territories of Mughal India. This necessitated the planning and construction of barracks and Company quarters near every large town. The confluence of the newly-commissioned Grand Trunk road and Bombay-Agra road made Delhi a place of crucial military importance. The aftermath of the Mutiny of 1857 led to further enforcement of control and the area around the Red Fort was cleared to enable the military to assert its supremacy. Civil administration was centred around the Secretariat built next to the northern Ridge within the safe confines of the Civil Lines (Fig.4). The new Viceregal Lodge with its protective barracks was built at an even safer distance across the ridge on the old alluvial plain of the Yamuna. Thus, the imperatives of colonial rule began to fashion the rules of town planning. This was reflected in the formation of the Delhi Municipal Committee in 1874. In the next decade the Committee proposed construction of a commercial square outside Lahore Gate, continuing into a new commercial quarter between the Gate and Sadar Bazar. These were supposed to be profitable

enterprises in the tradition of the East India Company. The close of the century also saw the intrusion of the railway line as it thrust through the ramparts of the Red Fort and Shahjahanabad. This new mode of transport began displacing the old trade routes with their sarais, since it generally followed the same alignments.

The railways continued their expansion in the beginning of the twentieth century and, in the process, the new planners pulled down the bastions of the Walled City and filled the city's protective ditches and canals. Thus, Delhi Sadar station was constructed between the old town and Sadar Bazar, disrupting the organic linkage between the two, while a Mercantile Boulevard was proposed between the Kabul and Ajmer Gates. A second city began rapidly growing in Pahargunj, Sadar Bazar, and Sabzi Mandi across the railway tracks. This led to the appointment of an Assistant Commissioner in 1908 as Officer on Special Duty to "plan the future expansion of Delhi on an orderly basis". This officer promptly recommended the westward expansion of the city across the ridge and the "improvement" of the older areas. By 1912 the dream of an Imperial city at Delhi was transformed into reality (Fig.5) and a Town Planning Committee was appointed for the purpose.

This Committee oversaw the acquisition of extensive areas in the southern basin for the construction of New Delhi. The architects Baker and Lutyens located the new Viceregal palace on the imposing height of Raisina hill with the new city spread out at its feet. Huge acreages were laid aside for the bureaucracy and ruling elite with spacious avenues and parks dominating the landscape. In the process much of the earlier drainage pattern, which had taken the run-off from the Aravalis to the tombs and gardens of the earlier rulers, was destroyed to make way for a new regime of stormwater drains. The Committee also assigned the Western Extension Area (WEA) for expansion, particularly for settling the "poorer classes". It decided to completely demolish the remaining city wall "to provide access of air to the congested area". For the first time land was acquired on the east bank of the river next to the railway line.

Deterioration and Review

We get a glimpse of the gap between planners and reality when, in 1924, the Harphool Singh slum clearance project was sanctioned to forcibly move the poor population to the WEA. But three years later, in 1927, it began to be reported that there was a population of 15,000 in the WEA living "in much discomfort owing to lack of services". Consequently, a northern expansion was recommended, beyond Civil Lines and across the Grand Trunk Road, on the outskirts of the old Sabzi Mandi. In spite of this, the Government had to agree to sanctioning 10 lakh rupees in 1930 for services in the WEA (although as much as 23 lakhs were required). Several new roads had been built into the new areas to ensure good communications and each one of these showed good financial returns. However, civic conditions continued to deteriorate so much that, in 1936, an ICS officer was specially appointed to go into the whole question of "congestion in Delhi" and suggest appropriate measures.

The recommendations of this officer eventually formed the basis for a further expansion of the city towards the Agricultural Institute in the west with adjacent industrial areas next to the railways (Fig.6). For this purpose, the Najafgarh jheel had to be drained and this was

accomplished by digging a cut through the northern tip of the ridge. In tandem, the Western Yamuna canal was filled up up to the Andha Mughal bridge across the Sahibi (now reborn as the Najafgarh nullah). This also enabled a push into the north to the new University through the new colonies of Shaktinagar and Roshanara Extension, specially meant for the poor. These poor were evicted from “evil slum areas” of the Walled City (now no longer with walls). Other areas from where the poor were displaced were the Mohtaj Khana next to the Sabzi Mandi, Reharpura in Karol Bagh, and Kala Pahar near Sarai Rohilla. The lands they vacated were converted gradually into middle-class residential areas. A vast area of prime agricultural land south of the Agricultural Institute was reserved for the army and there was even a minor thrust eastwards to found an industrial estate at Shahdara. All these developments were naturally shaped by the alignment of the railway lines and roads.

Post Independence Delhi

The 1941 census revealed that, in 40 years, the population had more than doubled to 9.17 lakhs. The next few years were politically tumultuous years and there was little time for mundane matters like town planning. But, with the partition of the country in 1948, there was a mass exodus from across the border and 4.5 lakh refugees arrived almost overnight at Delhi. The Ministry of Rehabilitation was entrusted with the task of resettling this huge population and it accomplished this by setting up a circle of colonies around the periphery of the city, mostly within the boundary set by what is now Inner Ring Road (Fig.7). Not only were the displaced families rehoused but opportunities were also liberally made available for them to economically and socially rehabilitate themselves. The Ring Road itself acted as a spur to commercial development. So massive was the investment that, by 1951, the Ministry considered that its job was over.

However, this huge planned expansion had its corollary effect on the city. In 1955 there was an epidemic of jaundice within the core of the city and 700 people died. In the subsequent investigation it was discovered that considerable amounts of untreated sewage from some of the new colonies were being discharged into the Najafgarh nala which, in turn, was releasing its load into the Yamuna just downstream of the pumping station at Wazirabad. The city’s water supply was thus contaminated, resulting in the spread of the epidemic. In response to the disaster the Ministry of Health immediately set up a Town Planning Organisation (TPO) and a barrage was constructed across the river at Wazirabad to separate the nala discharge from the water intake. The TPO also produced an Interim General Plan in 1957, which is a good example of how planners respond to unplanned disasters.

The First Master Plan

In order to provide better administrative and financial support to the planning exercise, Delhi was declared a Union Territory in 1956 and the Delhi Development Authority (DDA) was constituted in 1957 by an Act of Parliament “to check the haphazard and unplanned growth of Delhi . . . with its sprawling residential colonies, without proper layouts and without the conveniences of life, and to promote and secure the development of Delhi according to plan”. For the next three years the TPO, guided by experts from the Ford Foundation, developed a

Master Plan for Delhi for 20 years and this was presented along with maps and charts for unprecedented “public” discussion in 1960.

The public debate on this initial document elicited over 600 objections and suggestions from “the public, cooperative house-building societies, associations of industrialists, local bodies, and various Ministries and Departments of the Government of India”. An ad-hoc Board was appointed to go into all these objections and it reportedly granted a personal hearing to all the objectors. In 1961 the Board reported its findings to the DDA and some proposals were modified while new ones were incorporated. Eventually the Master Plan of Delhi was formally sanctioned in 1962 and came to be known as MPD-62.

MPD-62 acknowledged that Delhi was likely to have an urban population of 56 lakhs by 1981 unless measures were taken to restrict it to 50 lakhs. This the planners proposed to do by building a 1.6 km wide green belt around Delhi and diverting the surplus population to the seven ring towns in Uttar Pradesh and Haryana. Within the city, it was decided that the walled city would be thinned out by relocating the population in New Delhi and Civil Lines. In 1961 there were estimated to be 8,000 industrial units which were located in non-conforming industrial areas. So several new industrial areas on 5800 acres were declared for accommodating these industries. The plan also provided for 85 sq.yd. plots with services for poorer families who were going to come to Delhi to work in these industrial areas and the commercial centres to be set up in different zones. In the process the DDA became the sole developer of the largest nationalisation of land in the world, outside the Communist nations.

But by 1971 itself it was becoming clear that the city was going to grow far beyond the conceptions of the planners. The total number of industries had increased to 26,000 and there was a huge spurt in the squatter population. So, in a frenetic burst of activity, the administrative machinery swung into action and, from 1975 to 1977, 1.5 lakh squatter families, consisting of a total population of 8-9 lakhs was forcibly moved out of the centre of the city into resettlement colonies on the periphery of the growing city. Each family was entitled to a plot of only 25 sq.yds. with common services, and 60,000 such plots were demarcated on the low-lying Yamuna flood plain alone. Interestingly enough, all the colonies were located very near the industrial areas (Fig.8). Also in 1977, the government regularised 567 unauthorised colonies, which had come up in contravention of the Master Plan, in order to make them eligible for minimal civic services.

The Second Master Plan

A new Master Plan should have been ready by 1982. But, instead, the entire city was geared to host the Asiad Games that year. Numerous roads, hotels, flyovers, offices, apartments, and colonies were constructed to cater to the needs of the Games and the anticipated commercial spillover. The second Ring Road became a magnet for further commercial and residential development. This obviously called for a large labour force and it is estimated that 10 lakh workers came into Delhi during that period alone. But the city could not cope with this additional burden. In 1985, the National Capital Region Board was set up in an attempt to plan for the balanced growth of the extended region around the capital. Also in 1985,

the first draft of the second Master Plan was published for comments. However, unlike the first Plan, this one was not summarised or translated into Hindi and Urdu, nor was it distributed publicly. Nevertheless, the draft came in for severe criticism from the government itself as being “conceptually defective” and the Delhi Urban Arts Commission (DUAC) was asked to prepare another plan.

The DUAC took a close look at the failures of the first Master Plan to detail its own Conceptual Plan. It was discussed in a select committee and modified to yield the second Master Plan, known as DMP-2001. This plan too called for limiting the urban population (to 112 lakh) by deindustrialisation, though it had nothing to offer for the non-conforming industrial units already existing (now estimated at 24,000). It also emphasised maintenance of ecological balance in the Ridge and Yamuna, decentralisation into districts, and provision of multi-nodal mass transport, with low-rise high-density urbanisation. Interestingly enough, it called for a special area status for the walled city as “it cannot be developed on the basis of normal planning policies and controls”.

Two years after the sanction of the new Plan, in 1988, there was an outbreak of cholera reminiscent of the 1955 jaundice epidemic. This time 1500 people died and they were all from the 44 resettlement colonies and 625 slum clusters where the poor lived. There was no concerted response from the administration. Even the disbursement of compensation was withdrawn, though it was recognised that the disease had spread through ground water contaminated by inadequate sanitation measures. This was inevitable given the nature of the low-lying areas in which the resettlement colonies had been located, by plan, in the first place. Thus, DMP-2001 was not only unable to tackle the problems created by the earlier period, it did not even incorporate its own analysis of the failures and weaknesses of past planning into its recommendations.

This systemic failure of planning is evident in the situation as it obtains today, three years short of the target date for a new Master Plan. Delhi has spread far beyond the confines of the Outer Ring Road. The green belt, that was specified in MPD-62, has largely fallen victim to land developers. The resettlement colonies and industrial areas, that were once supposed to be at the fringe of the city, have been drawn into its ambit. Narela, for instance, which was supposed to be a ring town under MPD-62, is now a connected suburb. Gurgaon, Faridabad, and Ghaziabad are contiguous urban sprawls and the arterial roads and national highways are the most congested in the region (Fig.9). And increasing numbers of the poor continue to live in shanty towns without services. It is presently estimated that there are over 1500 unauthorised colonies without civic amenities and as much as 60% of the population lives in sub-standard housing.

The Future

The planned future is hardly likely to be any better. On the anvil are a Mass Rapid Transport System, an Express Highway girdling Delhi, an International Hotels Complex, a Yamuna Development Scheme, a major relocation of 10,000 non-conforming industries, and at least three mammoth residential colonies - with a likely total investment of over Rs 20,000

crores. If the past is any guide, these developments will swallow up most of what remains of the State by 2020 (Fig.10). The consequent impacts on land, water, air, and living creatures are not yet within the grasp of city planners. Two court cases - one on the fate of polluting industries, and the other on the regularisation of unauthorised colonies - clearly reveal that the planners have not come to grips with the magnitude of the problem. We make a brief attempt here to show how the heritage of past planning leads organically into the chaos of the future, in at least one field - that of transportation, and its attendant pollution.

Based on population data available from Census reports, number of vehicles given by the Delhi Statistical Handbook, and area figures computed from the maps constructed in Figs.4-10, it is possible to trace the growth of Delhi in the last fifty years, as given in Table 1. The trends of changing population density and vehicles per capita are plotted in

Table 1: Growth of Delhi

Year	Population (lakhs)	Area (sq.km.)	Vehicles (lakhs)
1941	9.17	46.9	0.19
1951	17.44	81	0.38
1961	26.60	127	0.81
1971	40.65	223	1.80
1981	62.20	321	5.73
1991	94.20	442	19.92

Fig.11, where it can be clearly seen that the growth patterns are exponential. If the trends are extrapolated along a straight line it is possible to get some idea of the figures for 2020. The shaded fans along each line give some idea of various estimates of population, area, and vehicles after 1991. For instance, it is probable that, at the extreme end, Delhi will have a population of 253 lakhs squeezed into an area of 810 sq.km. and using 86 lakh vehicles - if present growth trends continue unimpeded.

What is also clear from the figure is that the roots of these frightening figures lie firmly embedded in past planning exercises. The years 1961 and 1981 - when the two Master Plans were formulated - are identifiable as the points on the curves when the trends sharpen and the curves become asymptotic. In other words, apart from the qualitative evidence already presented, the figures show that the Plans themselves are responsible for the manner in which Delhi has grown. It is, therefore, not merely a matter any more of tinkering with another planning exercise that will lead the city's problems towards easy solution. The very nature and principles of urban planning are being called into question. We may illustrate this by conducting a simple analytical exercise for the possibilities of mitigating vehicular pollution.

Alternate insights

Let us assume that:

P = total population,

V = total number of vehicles,

A = total area, and
 e = average emission per vehicle;

then: pollution per unit area = $V/P \times P/A \times e$

Now, if pollution in the future (_f) is to be = half the pollution now (_n)
 then: $(V/P \times P/A \times e)_f = 1/2 (V/P \times P/A \times e)_n$

This is possible only if either V/P is reduced by half,
 or P/A is reduced by half,
 or e is reduced by half,
 the other factors remaining constant.

Now, Fig.11 is already indicating that both V/P (per capita vehicles) and P/A (population density) are increasing, and even if it were technically possible to reduce e (average emission per vehicle) by half, the average pollution levels would decline, if at all, much slower. To double the area, or to halve the population, or to drastically reduce the number of vehicles are instruments that the present planning process is patently incapable of putting into place. Hence, planners are trapped in a bind of their own creation. Unless other ways of thinking and planning are adopted.

One possible route is to look at the vehicular distribution.

Supposing:

V/A = the average vehicular density per unit area,

s = percentage of two wheelers,

c = percentage of four wheelers,

b = percentage of buses, and

q = unit emission from a two-wheeler.

Then, assuming that emissions are correlated to average fuel consumption levels for different kinds of vehicles:

unit emission from a four-wheeler = $2q$,

and unit emission from a bus = $4q$

So, total pollution load per unit area = $V/A \times (s + 2c + 4b) \times q$

Now, the present distribution of vehicles is roughly 67% two-wheelers, 24% four-wheelers, and 1% buses (the remaining 8% are goods vehicles and three-wheelers and may be ignored for the present). In other words, we may assume that:

$$s_n = 67b_n$$

$$\text{and } c_n = 24b_n$$

Thus, present total pollution load per unit area = $(V/A)_n \times (67 + 2 \times 24 + 4 \times 1)b_n \times q_n$
 $= (V/A)_n \times 116b_n \times q_n$

Now, suppose in the future, the number of buses doubles. Each bus may conservatively be assumed to carry the passengers of 33 two-wheelers and 12 cars. In other words, in the future scenario, the vehicular distribution could change to:

$$\begin{aligned}
 s_f &= 17b_f \\
 \text{and } c_f &= 6b_f \\
 \text{while } b_f &= 4b_n \text{ in real percentiles} \\
 \text{and } (V/A)_f &= 1/4 (V/A)_n \text{ in real percentiles}
 \end{aligned}$$

$$\begin{aligned}
 \text{So the future pollution load per unit area} &= (V/A)_f \times (17 + 2 \times 6 + 4 \times 1) 4b_n \times q_n \\
 &= (V/A)_n \times 33b_n \times q_n
 \end{aligned}$$

Clearly, therefore, it is possible to reduce the total pollution load, not just by half, but by two-third in the future. Other less conservative scenarios can now begin to be drawn, depending on the interest and biases of the planner as well as the real requirements of civic society. Fig.11 provides the data base for some of these other scenarios.

Democratic Planning

The impact of doubling the number of public buses and, thus, dramatically reducing the number of private vehicles, will not be manifest in pollution loads alone. It will also be reflected in the decongestion of the roads, the sharp fall in the need for road and parking space, the increase in the comfort level for bicyclists and pedestrians, the decline in accident rates, and the emergence of a safer city. But people will not use buses until the system is planned in a user-friendly manner. Planners know that between 1961 and 1986 the percentage of cyclists fell from 60% to 17%, while that of users of public vehicles rose from 30% to 50%. Theoretically, therefore, the percentages should have changed even more by now. Nevertheless, city planners and transport managers are still focussed on the private vehicle (which went up from 10% to 17% in those twenty years) as an essential mode of transport.

Furthermore, the data can be misleading because it is biased in favour of those who use motorised transport. Recent sample surveys from the resettlement and unauthorised colonies and the jhuggi-jhonpri clusters, where 60-70% of the population is estimated to be living now, indicate that these citizens are still largely dependent on cycling (44%), bussing (26%), and walking (20%) to work. But their activity does not show up on the official charts because they are all, in a legalistic sense, “unauthorised” and, therefore, only to be continually uprooted and translocated to the periphery of the ever-growing city. In other words, it is not just a question of transportation modes but also the manner in which the city is socially structured and the planning exercise rooted within that structure.

It is not true that planning theory has not tried to address these questions. Even in the heyday of Imperial Delhi’s construction, there were architects like Patrick Geddes who were rebelling against Lutyen’s and Baker’s understanding of how cities should grow. Christopher Alexander and his colleagues (quoted at the beginning of this paper) have given valuable insights in later times into alternative ways of looking at urban growth. And if we are to study, for a

while, the manner in which pre-colonial cities grew in the Delhi region (Figs.1-3), then several principles of organic urban settlement will become clear. Briefly, these are as follows:

1. Urban aggregations do not grow from the centre outwards, but in a cellular fashion. When one cell has outlived its function, another one grows in the region.
2. These cells do not adjoin one another but are distributed within and have intimate links with the countryside and with nature.
3. The presence of flowing and clean water is essential for a healing way of life, as it reflects the entire environmental milieu in which the city lives..
4. All cells are a composite of sub-cultures, and each sub-culture should ideally not exceed a community of 10,000 persons who can remain in human touch with each other.
5. Work cannot be zoned into isolated areas but has to be distributed through the community to provide living and healthy neighbourhoods as well as safe work.
6. The web of public transportation within and between cells has to link up with local transport areas which encourage walking and cycling within neighbourhoods.
7. Consultation with and active participation by neighbourhood communities is an imperative for alternative planning.

Of these above criteria, the last is the most crucial because it is the only democratic way of developing the organic linkage between planning and people. It was briefly undertaken at the time of the first Master Plan and completely forgotten after that. Even then it was obviously confined to a highly literate and socially assertive group within the population. Unless there is a massive campaign to let the people of the city know about the different principles of planning; unless people know what options they can logically choose from; and unless this includes all the people with their conflicting interests: it is hardly likely that community participation in the planning and implementation process can take place. Professional planners, in fact, will not even be willing to concede that people can participate in such processes. But with the potential urban disasters of Delhi looming in the future, and the target date for a third Master Plan coming closer, these are issues which will have to be seriously and objectively addressed.

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