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The politics of green and blue space availability: Case of Bhopal
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Abstract

The study elaborates Bhopal’s urbanity to accessible Green and Blue spaces in the city that has remained latent in equitable spatial distribution. Routinized silting and episodic encroachment into the major lakes of the city maligns the guidelines under the rubric of National Green Tribunal (NGT). In 2014, NGT set a buffer mark of 300m for upper lake which was brought down to 50m in 2018. Similarly for Kaliasote reservoir, the buffer set was 200m, now it is 33m. In the past 20 years, the green cover in the city has shrunk from 66 percent to just 22 percent and is expected to reduce further to a frightening 4.1 percent by 2030. The study conveys illustrative analysis and interpretations have led to the underlining of facts and the need of the revision and recommendation in existent, projected and the proposed spatial plans.

Keywords: Green and Blue infrastructure; Equity; Policies; Guidelines; Accessibility

1. Literature study

The city region of Bhopal is dotted with elevations of undulating nature ranging from steep hills to shallow valleys in the study area. There are large number of open spaces and parks distributed within the city. Recreation is related to the pure need of the residents in the city. It is more of a necessity to the society rather than a land use that longs for revenue generation through the activities and land-use.

Myriad cities have dealt with the green and blue infrastructure in a very effective manner. For instance, Chicago has various programs through which it gives incentives to people who build green roofs for their buildings. The incentives are provided from Green Roof Improvement Fund and Green Roof Grant Program. In three years this programme offered grants to 72 projects with the fund. An amount of $5000 was given in 2005, 2006 and 2007. (Wetlands, 2010) In 2006, an eminent measure was taken by the Chicago Department of Transportation (CDOT) to reduce flood called the Green Alley Program. The department identified 3500 acres of alleys having impervious pavement. To increase the infiltration of runoff, several tests were done with different types of materials. Finally in 2009, the CDOT had carried out the programme in hundred plus alleys. The programme became permanent towards the dawn of 2009 (Wetlands, 2010). Another program, called the Green Permit Program works with a view of providing a lower permit fee for those who qualify for green built. This incentive is provided by the Department of Buildings Green Permit Program (Wetlands, 2010). On Portland, Oregon, the properties that have an impervious surface of more than 500 sq ft need to follow the Pollution reduction and flow control requirements set by Portland. The projects aiming at discharging new storm water outlets outside their site also have to comply with the above-mentioned requirements (Wetlands, 2010). In Santa Monica, California the Government gives a landscape grant of $160,000 annually to the people who use landscaping ways that lead to lesser consumption of water and acts as a good runoff absorbent. (Wetlands, 2010). According to Indian Institute of Science, Bhopal’s green cover has reduced drastically from 92% in 1977 to 66% in 1992 and then to the present 22% due to rapid urbanization and industrialization and is further expected to reduce to 4% by 2030. The benchmark green area of 15% is proposed by URDPFI guidelines of Ministry of Urban Development (MoUD), Govt of India. The programs and policies from the case studies could be implemented in the Bhopal context for availability of green and blue spaces in the city.
2. Introduction to the study area

Bhopal, the capital city for Madhya Pradesh, upholds the name for which the city is labelled “The city of lakes”. Green cover plays a vital role in enhancing the quality of life as well as maintaining a balanced life cycle on earth, lakes and gardens in Bhopal make their charm felt among the tourists because of their immaculate beauty. The city is segregated distinctly into three parts: The old city, The T.T. Nagar and its extension being developed on the Southern side and is separated by the old city – Upper lake and Lower lake B.H.E.L is separated from the new township as well as the old city by Railway line. The city has also been selected as one of the 32 mission cities under Atal Mission for Rejuvenation and Urban Transformation (AMRUT). The map below shows the location of the city and the context connectivity. The centrally located upper lake forms the landmark for the city. The city further extends to Mandideep towards the South East.

At present, Bhopal has 12,000 ha (30,000 acres) of land under tree growth, 34 Institutional campuses within Bhopal Municipal Corporation (BMC) jurisdiction, accounts for a total area of about 1138 ha of land area and 400 parks or open spaces including green spaces provided in the TT Nagar area based development area.

3. Green cover assessment

Bhopal has a wide range of green cover ranging from reserved forest, Protected forests and a National park. The Urban Green Spaces can be defined as the Public and private open spaces in urban areas that are mainly covered by vegetation and is directly or indirectly available for users. The generated land cover map of 2021 shows that Bhopal has evergreen forests majorly towards the Southern side of the city. Other forests are majorly located towards West

Figure 1: Bhopal regional context and connectivity. Source: SPA Studio
and South of Bhopal. Agriculture can be seen majorly towards the periphery of the Bhopal Municipal Corporation boundary and is spread throughout the area radially. Patches of waste land can be seen majorly towards the North, East and South. Current fallow land is located towards South west. A National park is located towards the center of the city near to Upper lake.

![Bhopal planning area, land cover, 2021](image)

*Figure 2. Bhopal planning area, land cover, 2021. Source: Author*

The area coverage of various green cover was found to be 975 sq km of area under agriculture, 294 sq km as other greens, 36 sqkm as current fallow, 35 sq km as evergreen forest and 20 sq km as waste land. The assessment of green cover of 2021 reveals that maximum land is covered under agriculture, followed by other greens and built up area, with a minimum of waste land. 63% of the green cover is under agriculture, followed by 19% of other greens, 3% of current fallow, 2% of evergreen forests and 1% of waste land.

![Percentage land cover in the city](image)

*Figure 3: Percentage land cover in the city. Source: Author*
3.1 Decadal change in Green cover

People concentrate better and there is improvement in the attention capacity leading to mental wellbeing of people and overall enhancement in the quality of life. This is called the Attention restoration theory (ART), introduced by Rachael and Stephen Kaplan in 1989. Urban green areas can provide services if plants have access to water. The process is impaired in the case of urban drought and excessive fragmentation of the natural system. Space for water and vegetation must be included both at the local level when individual investments are planned and in the strategic plans for the overall development of the city as an agglomeration. Figure 4 below the decadal change in the green cover in Bhopal city. It is observed that in 1990, the green cover in the city was 44.67%, followed by 34.73% in 2000, 29.51% in 2010 and then to a appalling percentage of 21.03% in 2021. The green patches that remain prominent are the protected and reserved forest and other delineated parks and vistas.

![Decadal change in Green cover](Source: Author)

Ensuring appropriate conditions for green and blue infrastructure is just as important as ensuring these conditions for any other urban fabric. Hence, proper analysis of green and blue infrastructure would help in better planning of the city. Bhopal has about 12,000 ha (30,000 acres) of land under tree growth. There are 34 Institutional campuses within BMC jurisdiction and accounts for a total area of about 1138 ha of land area. Baghaan as a Readers park was an initiative by “Bhopal runners”, a not for profit society. The concept is to build reading habits & to encourage the readers. 25 readers are proposed by BMC which would be the existing parks that would be converted to Readers Park. Major features of the park would be a library, a cafeteria that would be run by differently abled people and a platform for events to take place for the students.
3.2 Green cover in the wards of BMC

As per the 2018 report of Bhopal Smart City development corporation, Ward no. 19, 20, 21, 22, 23, 35, 36, 39, 40, 41, 42 lie towards the centre of the city and have the least green cover. Ward no. 24, 29, 26, 29, 31, 33, 47, 75, 13, 54, 57, 59, 74 have the densest green cover. These wards lie near Van vihar National park, Kaliasote reservoir and Shahpura lake. All other remaining wards have partial green cover. Thus, 69% of wards have moderate green cover, 18% with dense green cover and 13% with least green cover.

3.3 Forest cover in BMC

According to the Indian State Forest Policy report classification of forests has been done based on the canopy of the trees. According to the 2011 report, Bhopal has 48% of Open forest, 26% of moderately dense forests and 26% of scrub. Thus, majorly the forest cover has canopy of a range of 40% to 10%, followed by a canopy range of 70% to 40% and 10%. The classification of forest covers based on the canopy is shown in the table below.

| Forest cover | Canopy density |
|--------------|---------------|
| Moderately dense | 70-40% |
| Open forest    | 40-10%   |
| Scrub          | 10%      |

Source: Graphic-Author, Data- India State Forest Report, 2011

3.4 Funding for green spaces: Atal Mission for Rejuvenation and Urban Transformation (AMRUT)

As per the sector wise allocation of funds of the Amrut Mission, Rupees 207.64 crore has been allocated for others and green spaces which accounts for only 2.5% of the total funds. Moreover, a fund of Rs 180 cr, that is 2.17% of the total fund allocation has been specified for Strom water drainage. Maximum fund of Rs 4628.2 cr that is 55.9% has been stated for Sewerage and Septage management.

4. Blue cover assessment

Bhopal has a total of 18 major lakes having different uses and the total waterbodies share around 3800 Ha of land out of the present planning area which is as close as 25% of the developed area. The natural drainage of the city is provided by three main streams. On the northeastern side, Halali, On the southeastern side, Kaliyasote River, both these rivers, drains out in Betwa, On the south western side, the drainage is provided by various small nallahs, which drain out in Kolar River, which ultimately joins river Narmada.

4.1 Upper Lake

Upper Lake forms the image of the city, appearing as an inevitable glance for all the visitors. The resorts and gardens around only form the most compelling visits for the incomers to the city. The biggest lake in the city that provides potable water is not used for commercial purpose and only serves for water supply and recreational purpose like boating. The catchment area of the lake is 166.27 sq.km with the water body having an area of 30.888 sq.km. The water body is mainly used for water supply and recreational activities. However, being the major recreation site for the city, equitable accessibility for the residents still remains a concern for the residents of the city. Upper lake is degrading in terms of total dissolved solids (TDS) which has gone way beyond the accepted standards and this is due to the development taking place around the water body (Pollution Control Board). The water quality of Upper Lake is under stress due to rapidly changing environmental conditions and modern urbanization. Due to encroachment, the lake is getting degraded at 2.01 million cubic metres per year. The silting capacity of the lake is
121 Million Cubic Metre and at the current rate of silting, the water body would be over silted within the next 60 years. Furthermore, untreated sewage and medical waste into the water body has only increased the adulteration of the lake.

Figure 5 shows the three zones with major encroachment sites into the lake. Khanu gaon to the North of the lake, is one of the encroached disputed villages thrives there despite the regulations set by the administration. The reason being the ignorance while the settlement continued to grow and further establish in a well-known commercial hub for Zardozi art work of the city for which it holds the geographical indication. In Khanu gaon 50-60% of the household are involved in Zari work. However, the working space is not adequate for the workers. The dwelling size is not enough to cater to their work place. Furthermore, the settlement of Khanu gaon is extended within the 50m buffer (as specified by NGT) of Upper lake. Thus, there is a need to look into the provision of working place for the artisans and to maintain the required buffer. Redensification of the settlement would lead to the provision of better housing condition of the dwellers as well as well-designed spaces.

The other two sites lie to the eastern side of the lake. The red boundary shows the catchment boundary of Upper lake with the stream order. The varying colors show the increase in encroachment to the lake. The lake lining remains unmonitored with undefined recreational site, making it even more vulnerable to encroachment and siltation.

Figure 5: Encroachment at Upper Lake. Source: SPA studio

The built ups which have come around the water body in 1992 was around 0.34% of the catchment area and has gone up to 0.94% in 2002 and further up to 1.26% in 2021. At present, the total area of built up is 2.91% of the catchment area. The encroachment falling under the buffer area provided by the NGT is 0.29% for Upper Lake. Thus, the present assessment for the lake points out to the dire need to look into the ongoing trend of increasing vulnerability which could lead to catastrophic events. Though NGT has issued a notice to the Ministry of Environment and Forest (MoEF) efforts still remain on papers. The avid breach in the norm with an increase of 2.62% is alarming and the trend can only be streamined with well-defined framework, relevant policies and its effective execution.
5. Proposals

5.1 Lake front development

Lake front development has been proposed along the Northern side of Upper Lake. It is a stretch of 8 km. The connectivity of the lake front has been taken into account. The entire lake front forms 2 loops connecting the main road. The lake front has legible entrances and exits. Natural drainage and storm water drainage have been considered in the allocation of activities in the spaces. The junction where natural drainage merges has been dedicated as Rain garden. It is a type of garden where native species of flora are grown and ground water recharge is promoted.

![Figure 6: Proposed Lakefront edge. Source: Author](image)

Stretch 1 includes the green vista along with Kiosk lane and Khanu gaon redevelopment. Stretch 2 is the lake view point with Gazeboz, arbor, trellis and an outdoor patio. Stretch3 is identified as the rain garden with natural drainage zone and a garden of native shrubs and trees. This is followed by art street encompassing outdoor painting zones for various competitions. Further, to move on to the green grove having a vantage point with an elevation of 513m. the stretch ends at the festival plaza with OAT, walkway, promenade and running route. The entire lake front stretch is laced with a cycle track of 3m, joggers lane of 3m and a green buffer of 5m towards the lake.

![Figure 7: lakefront stretches. Source: Author](image)
5.2 Public realm

It is important to address the issues regarding public realm as the creative workforce needs open spaces and interactive atmosphere for better performance in the creative the creative cluster and its attractiveness not only for the professions but for the public as well as the tourists. Most of the parks are concentrated towards the central area of Bhopal Municipal Corporation; the areas towards the peripheral areas are devoid of adequate and accessible green. Thus, parks of a total of 21 acres have been proposed in the identified government plots within the vicinity of the residential areas. Proper connectivity has also been considered as one of the factors for identifying the location of proposed parks.

Figure 8: Proposed parks in the city-region. Source: Author

6. Conclusion

The green and blue infrastructure of Bhopal define the city. The need of the hour is to revise the only policies existing are the National Action Plan on Climate Change and National Water Policy 2012 which were framed in perview of the situations then. Even thought the guidelines set by WHO and URDPFI are met, the accessibility to the green areas and their useability still remains a matter of concern. The policies need revision and reframing to address the current ecosystem challenges. Furthermore, providing equitable accessible green spaces and placemaking should be prime concern for the authorities involved. Once the micro level need is met, the macro becomes accessible as well as available. This majorly involves policies revision, guidelines restructuring, effective equitable implementation of ideas and ardent monitoring to actually retrore the title of the “City of Lakes”.

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