

From Colonial Retreat to Crowded Hill Station: The Roots of Mussoorie's Urban and Environmental Challenges

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Abstract

The present form of Mussoorie, located in the lower Himalayan region of Uttarakhand, is a result of the long-term process of its historical development. Established as a colonial hill station in 1825, the city developed into a major tourist center over time, but today it is facing increasing environmental pressures. The study used available research on colonial hill towns, peer-reviewed environmental studies, Census of India data and a 2023 report on the carrying capacity of Mussoorie prepared for the National Green Tribunal. A combined analysis of these sources indicates that the background of many current challenges such as limited availability of limited land for construction, water crisis and uncontrolled construction is linked to the spatial planning and infrastructural system developed during the colonial period. Population figures also reflect this change. For almost three decades the city's permanent population remained around 26,000, while the number of tourists visiting annually increased to more than 30 lakh. To understand this historical change, the study analyzes the process of development of Mussoorie from its colonial establishment to post-independence changes and the rapid expansion of tourism after the 1990s. In this process, the city developed for a limited population gradually began to accommodate a larger seasonal population far beyond its capacity. Although various planning efforts were made from time to time, they could not balance development with the physical limitations of this sensitive hilly region. The study concludes that current environmental crises cannot be considered solely the result of recent tourism expansion. Although these crises did not have their direct origins in the colonial period, the structural limitations that developed at the same time persisted during subsequent development and became more pronounced over time.

Keywords: Mussoorie, colonial hill stations, carrying capacity, sustainable tourism, urban expansion, Himalayan urbanisation

1. Introduction

Hill stations have had a special place in the urban history of the Indian subcontinent. Most Indian cities

developed as trade centers, pilgrimage sites, or agriculture-based settlements, whereas hill towns emerged mainly as planned projects of colonial rule. They were established around 1815 to 1870 when the British rulers were searching for places whose climate seemed closer to their native country (Kennedy, 1996; Sharma et al., 2022). Mussoorie, established in 1825, was a result of this historical process. Over the next two centuries, it evolved from a few shooting lodges and sanatoria to one of the most popular mountain tourist destinations in North India. At its peak, it received more than three million tourists in a single year (UK SPCB, 2023).

This transformation of Mussoorie was not an easy process. Research studies and official investigations have repeatedly identified Mussoorie as a hill town facing an environmental crisis. Their major concerns have been traffic congestion, deepening water crisis, hotels built in unsuitable locations, increasing solid waste pressure and landslide risk on earthquake-sensitive slopes. (Madan & Rawat, 2000; Sundriyal et al., 2018; UK SPCB, 2023). These problems are often seen as the result of recent tourism expansion, but such a view fails to fully capture their historical context.

The central argument of this paper is that the roots of Mussoorie's current problems lie in its spatial and infrastructural structure developed during the colonial period. The city's physical layout was that of a low-density settlement. It developed along a narrow mountain ridge, where limited natural water resources were available and there was no systematic master plan. This settlement was established keeping in mind the limited European elite and seasonal population of a few thousand. Even after independence, there was no fundamental change in this basic urban structure. When domestic tourism expanded rapidly after the 1990s, the same infrastructure came under pressure from a much larger population, even though its original capacity was not that much. The colonial period was not the direct cause of today's crises, but it left structural limitations that subsequent development could not overcome.

The problems of Mussoorie are not limited to this city only. Shimla, Nainital, Darjeeling and other former colonial hill towns are also facing more or less similar challenges. All these cities were developed on the basis of narrow roads, limited water resources, steep slopes and low-density settlement. Currently, due to increasing tourism pressure, these physical characteristics have turned into their biggest limitations (Sharma et al., 2022). In this broader perspective, this study divides the development of Mussoorie into three main phases: colonial establishment (1825–1947), post-independence period (1947–1990) and tourism expansion after 1990. On this basis, it has been analyzed how this process of historical development has shaped today's sustainability challenges.

2. Sources and Method

This paper is not based on original fieldwork; instead, it uses qualitative historical analysis. For this, three types of secondary material have been used. The first category includes available studies on colonial hill stations, notably Kennedy's (1996) research on the hill towns of the British Raj and the Scopus-listed survey (Sharma et al., 2022) based on the development of Indian hill towns. The second category includes peer-reviewed environmental research related to Mussoorie (Madan & Rawat, 2000; Sundriyal et al., 2018). In the third category, official records have been used, which include data from the Census of India, data from the Uttarakhand Tourism Development Board and a 2023 status report on the carrying capacity of Mussoorie prepared for the National Green Tribunal (UK SPCB, 2023).

The credibility of the sources has been carefully evaluated. Government reports, Census of India data and peer-reviewed and Scopus-listed studies formed the main basis of the analysis. Relatively less reliable material has been used only in situations where it was possible to confirm it from other sources. In cases

such as population and tourist numbers, where differences in data occurred due to different institutions and calculation methods, these differences were clearly recorded rather than hidden. This study adopts an interpretive approach. Instead of collecting new primary data, the available evidence has been analyzed in the light of a central question: can the city's current problems be linked to the boundaries that were laid in the colonial period?

3. The Colonial Origins of Mussoorie (1825–1947)

According to Dane Kennedy (1996), British hill stations were places of refuge for the European community as well as centers of colonial surveillance. Here Europeans could find relief from the heat and diseases of the plains. At the same time, the ruling community could maintain social distance from the people it ruled, and recreate its familiar social structure (Kennedy, 1996). Mussoorie's initial development followed this colonial approach. The area where the city later developed was leased to the East India Company by Sudarshan Shah, the ruler of Tehri. Among the earliest constructions were a shooting lodge built in 1823 by Doon Superintendent F. J. Shore and a residence built shortly afterward by Captain Frederick Young. In 1827, a sanatorium was established in Landour for the health benefits of British soldiers and in 1830 it was formally declared a cantonment (Singh & Singh, 2025). From these early arrangements it appears that Mussoorie was developed keeping in mind the colonial needs such as health benefits for soldiers, seasonal rest and entertainment.

This colonial settlement was not established on any uninhabited land. Before 1820 this area was under the jurisdiction of Tehri State. The surrounding villages, of which Kyarkuli and Bhatta were prominent, came under the local zamindari system and had their own place-names and land rights (Singh & Singh, 2025). The transfer of this land to the East India Company and the subsequent construction of roads, barracks, hotels and other institutions depended largely on local labor and resources. Despite this, this developing city was built mainly keeping in mind the needs of the European community. Indian residents, including merchants, servants, and laborers, were largely confined to markets and outlying areas and spatially separated from British cottages located on hill ridges (Sharma et al., 2022). It was not just a question of social hierarchy. From the beginning, the physical layout of Mussoorie was developed to suit the needs of a small colonial elite and the principle of spatial separation rather than the needs of a large or ever-growing population.

Two features were particularly important in colonial planning. The first was the availability of water. According to Singh and Singh (2025), the British authorities had initially considered settling in the Bhadraj and Hathipaon areas, but abandoned these places due to lack of adequate water availability and ultimately selected the present site on the basis of natural springs present there. From this point of view, the availability of water determined the physical limits of the city's expansion from the very beginning. However, it would not be accurate to view colonial-era Mussoorie only as a water-stressed city. In the first decade of the twentieth century, the Municipal Board developed an ambitious water supply scheme that carried water from Murray Springs to reservoirs about 1,700 feet above Vincent Hill. At that time it was reported to be the tallest water lift scheme in Asia (Doon Gazetteer, as cited in CEDAR, n.d.). By the 1920s, the city was estimated to have about 26 gallons of water per person per day, one of the most generous water supply systems among hill towns in India at that time. The colonial water system was developed according to the needs of its time. Problems arose in later decades when the same infrastructure became burdened by a much larger population and tourist pressure. The problem came to light when this

system developed for a relatively small town was not expanded according to the increasing population and tourism.

The second major feature of colonial planning was that systematic grid-based planning was not adopted in the hill towns. In contrast to the cantonments and civil stations of the plains, the British followed the mountainous topography and developed cottages, bungalows and public buildings as low-density settlements along the ridges and lakeshores (Kennedy, 1996; Sharma et al., 2022). The distinctive structures of the colonial hill town - the Mall, the adjacent Anglican Church, the club, the library, the boarding school and the European-style villas - were developed not with future urban expansion in mind, but with the aim of creating an ideal English scene. According to Anthony King, with whom Kennedy also agrees, the hill towns were a means of maintaining the social structure and way of life of the British colonial community in India (King, 1976, cited in Kennedy, 1996). This physical configuration also determined the direction of Mussoorie's subsequent development. The settlement, which developed on a narrow mountain ridge without adequate scope for expansion, limited the possibilities for developing the infrastructure needed to support the growing population and the mass tourism economy that subsequently emerged.

Similarly, many such institutions also developed during the colonial period, which later gave a new shape to the prestige of Mussoorie. A library was established here in 1843. Major schools such as St. George's College were established in the mid-nineteenth century, the Charleville Hotel was built around 1852, banking services began, and by the beginning of the twentieth century, electricity supply and road networks had expanded significantly (Singh & Singh, 2025). With the arrival of railways in Dehradun around 1900, travel to Mussoorie became more accessible, due to which tourist traffic started increasing here (Singh & Singh, 2025). Despite this, the permanent population of the city remained limited. According to the 1901 census, its permanent population was only 6,461, which increased to about 15,000 in summers (Census of India, 1901). Mussoorie's infrastructure, including roads, water supply system based on natural springs and building construction, was developed keeping this level of population in mind.

4. Mussoorie in the Postcolonial Period (1947–1990)

It was 9,849 in 1951, which increased to 18,038 in 1961 and 26,424 in 1971. Rehabilitation of refugees and institutional expansion were also the main reasons behind this increase (Singh & Singh, 2025). In contrast, the settled population remained almost stable over the next three decades. It was recorded at 26,722 in the 1991 census and 26,075 in 2001, not much different from the 1971 level (Census of India, 1991, 2001).

These permanent population figures do not present the complete picture. The foundations of the later crisis began forming during these decades. The permanent population remained almost constant, while the number of visitors continued to increase. According to Madan and Rawat (2000), tourism records recorded the number of visitors in 1958 at 151,065, which increased to more than 15 lakh (1.5 million) by 1994. After 1989, unrest in the Kashmir Valley diverted a large portion of Himalayan tourism to Garhwal, further accelerating this growth. During the colonial period and the early decades after independence, Mussoorie's housing, water supply system and roads were developed keeping in mind a permanent population of a few tens of thousands. In later years the real pressure on the city began to be determined by the temporary tourist population which was not reflected in the permanent population figures. By the late 1980s, nearly one in every five new buildings constructed in Mussoorie was a high-rise hotel (Madan & Rawat, 2000).

Within the same physical setting a residential mountain town was gradually transforming into a tourism-based economy.

Two changes that occurred in the 1960s and 1970s deeply influenced the further development of Mussoorie. Firstly, limestone mining started increasing rapidly in the upper areas of the city, due to which the forest cover was destroyed and the natural water sources were also affected. Following a local public movement, the Supreme Court banned mining in 1988 (CEDAR, n.d.). The second change is relatively less visible. Powers related to the city's water supply and building construction shifted from the elected Municipal Board to state-level institutions, including the Jal Sansthan for water supply and the Mussoorie Dehradun Development Authority for building regulation. None of these institutions were directly accountable to the city's residents (CEDAR, n.d.). As the pressure of development increased, the powers of local administration also gradually passed into the hands of institutions located outside the city.

5. The Growth of Tourism and Urban Expansion (1990–Present)

With the liberalization of the Indian economy after 1991 and the rise in middle class incomes, domestic tourism expanded across the country, and Mussoorie also became part of this broader trend (Sharma et al., 2022). According to the report prepared for the National Green Tribunal based on state tourism records, the number of annual tourists in 2000 was 850,746, which increased to 3,023,839 by 2019. This represented an increase of approximately 255 percent in two decades. A temporary decline in tourist numbers was recorded due to the pandemic in 2020 and 2021 (UK SPCB, 2023). After this, the figures of Uttarakhand Tourism Development Board indicate recovery. The number of tourists is expected to increase from approximately 12.3 lakh (1.23 million) in 2021 to 14.7 lakh (1.47 million) in 2023 and 21.3 lakh (2.13 million) in 2024 (Uttarakhand Tourism, 2021–2024). This number did not reach 2019 levels until 2024, but the long-term trend points towards continued increasing numbers of tourists.

These tourist statistics should be interpreted with caution. Data for different periods are based on different institutions and different calculation methods; Therefore this data series is not completely continuous. For example, the data presented by Madan and Rawat for the mid-1990s cannot be directly compared with the state tourism department's baseline data of 2000. Therefore, rather than viewing these two data sets as a continuous series, it would be more appropriate to understand them as independent indicators of the same broad trend of tourism growth. Both sources point to a steady increase in tourist numbers after 1958, with the pace of growth accelerating after 1989 and 2000.

As the number of visitors increased, the city also expanded rapidly. The road network within the Mussoorie Municipal Area increased from 219 kilometers in 1990 to 585 kilometers by May 2023 (UK SPCB, 2023). There was also a significant increase in the capacity to accommodate tourists. The number of registered accommodation units increased from 140 in 1998 to 186 by 2011. By that period, the city had about 180 hotels with approximately 3,900 rooms, while the number of homestays exceeded any reliable count (Sundriyal et al., 2018). The effect of this expansion is also visible in the difference between permanent and seasonal populations. According to Sundriyal et al. (2018), population density increased from 98 persons per square kilometer in 1901 to 465 persons per square kilometer in 2011, reaching 1,000 persons per square kilometer during the peak tourist season. The permanent population of the city in 2011 was only 30,118 (Census of India, 2011), while the actual burden on the city during the peak tourist season was many times higher. The change in census rank also reflects this trend. Mussoorie was in the lowest urban category in 1901; by 1991, it had risen to Class III and remained in that category thereafter (Pant & Chand, 2020).

This entire development was contained within the spatial framework developed during the colonial period, rather than being reorganized to suit a new urban form. Malls, settlements developed along mountain ridges, water supply systems based on natural springs and the network of narrow roads remained mostly intact, even as the pressure of people and vehicles within them continued to increase. According to Madan and Rawat (2000), by the 1990s the Kulri area was beginning to resemble the crowded markets of the plains towns and the distinct identity of the hill town was gradually eroding.

6. Contemporary Challenges to Sustainability

The gap between colonial-era infrastructure and current needs is reflected in four interrelated problems: water scarcity, waste management, traffic congestion, and construction on unstable slopes. Of these, the water crisis represents the most direct link between the colonial legacy and current circumstances. Mussoorie's water supply has been dependent on natural springs from the beginning, and available records indicate a rapid decline in these sources. While about 120 natural water sources were previously recorded, recent surveys found that their number had fallen to about 20 (Madan & Rawat, 2000; Sundriyal et al., 2018). According to Sundriyal et al. (2018), approximately 14.40 million liters of water were required per day during the peak tourism season, while the available water supply was only 7.67 million liters per day. As a result, there was a water shortage of about 6.73 million liters per day, whereas in the non-tourism season this difference was relatively less. The water supply system developed during the colonial period was not expanded in time, making this gap more evident as demand increased. Another dimension of the water crisis is related to colonial water administration. Colonial water laws established public control over surface streams, while groundwater remained under private ownership; This system remains largely the same even today. At present, large hotels and at least one major institution are meeting most of their water requirements by pumping private groundwater. This meets their needs, but it does not directly improve the municipal public water supply system (CEDAR, n.d.).

The relationship between the colonial legacy and waste management or traffic congestion is less direct than in the case of the water crisis. Large numbers of tourists increase waste generation and traffic pressure in any city, whether colonial in origin or not. The difference is that the physical configuration of the colonial period does not create these problems, but makes their management more difficult. In cities developed according to the grid plan on flat land, expansion of roads and reorganization of the waste collection system is relatively easy; The topographical nature of Mussoorie limits such possibilities. Its problems are linked to the increasing number of tourists as well as to the spatial configuration that developed in the nineteenth century, which limited the scope for managing the increasing pressure.

Municipal solid waste generation is highest during the peak tourism season. During this period it reaches approximately 18 metric tons per day, of which the largest portion is biodegradable matter, while dry waste is mainly composed of plastics (Sundriyal et al., 2018). Because the city developed along a mountain ridge, a large part of this waste reaches the surrounding slopes. According to Madan and Rawat (2000), more than half of the waste generated was dumped on the slopes, reflecting both the structural limitations of the settlement and the lack of flat land. Air quality data also confirms this pressure. During monitoring, atmospheric particulate matter was found to exceed the national standards set by the Central Pollution Control Board. The main reason for the increase in fine particulate matter during summer was vehicle emissions. According to Madan and Rawat (2000), about 96 percent of tourists used private vehicles. The only main road coming from Dehradun and the narrow roads developed along the mountain edge

concentrate this traffic on limited routes, whose expansion is not easy. For this reason, traffic jams persist for several hours during the peak tourism season (Sundriyal et al., 2018).

Construction on unstable mountain slopes is the most serious aspect of this environmental crisis and most clearly highlights regulatory failures. Mussoorie lies in seismic zone IV, and the geographical boundaries of this zone have been known for a long time. A formal ban on construction in areas identified as "freeze zones" was imposed in 1996. A subsequent carrying capacity study conducted by the Lal Bahadur Shastri National Academy of Administration in 2001 concluded that further construction was not viable (UK SPCB, 2023). The same study also found that more than half of the city's built-up area was already located on areas with slopes greater than fifty degrees (Ramachandran & Ramachandran, 2001, as cited in CEDAR, n.d.). Despite this, construction continued. Sundriyal et al. (2018) also make clear that most of Mussoorie's major tourist destinations are located in areas with low or very low absorption capacity. This makes clear that the greatest pressure falls on the areas least able to absorb it.

These concerns gained new importance after the Joshimath land subsidence crisis in early 2023. Taking cognizance of a news report titled "Joshimath disaster a warning for Mussoorie", the National Green Tribunal constituted a nine-member committee to study the carrying capacity of Mussoorie. The committee's 2023 status report highlighted uncontrolled construction, waste-management failures, sanitation problems, water scarcity, and increasing traffic pressure. The report suggested measures like registration of tourists as per carrying capacity, tourist fee for waste management, mandatory geotechnical clearance before major construction works, technical audit of multi-storey buildings, rejuvenation of natural springs and rooftop rainwater harvesting (UK SPCB, 2023; Outlook India, 2024). The report also clarified that there is no evidence of any direct scientific link between the problems in Mussoorie and the Joshimath land subsidence. At the same time, it indicated that current problems are linked to development that has ignored the area's physical limits (UK SPCB, 2023).

7. Conclusion

The history of Mussoorie is often presented as a simple and attractive narrative, showing the "Queen of the Hills" evolving from a colonial resort to a modern tourist destination. But this research paper presents a different explanation. Mussoorie was established as a low-density settlement for a limited colonial elite. It developed on a narrow mountain ridge, whose water supply system was based on limited natural springs, and its basic spatial configuration, developed between 1825 and 1947, remained essentially unchanged in later times.

The reason for this was not the absence of planning documents, but rather their inability to be effectively implemented. The city's master plan, the 1996 "freeze zones," and the 2001 carrying capacity study all underscored the need to impose necessary limits on development. Therefore, the current crisis cannot be understood solely as a result of colonial legacy; it is also linked to weak governance. Authority over the regulation of water supply and building construction was taken away from local municipal boards and transferred to state-level institutions that were not directly accountable to the city's residents (CEDAR, n.d.).

After independence the permanent population increased only slowly, while the number of tourists visiting annually increased to several million. As a result, the infrastructure developed for the relatively small settlement began to come under increasing pressure. Therefore, seasonal water crisis, traffic jams, uncontrolled construction and increasing waste cannot be understood as the result of tourism or any single decision, but it is more appropriate to understand them as the result of a long-term historical process.

Although colonial planners could not have anticipated the present-day nature of tourism, the spatial framework they developed remained largely unchanged, while subsequent administrative systems failed to adapt it to changing needs.

This study also shows that the geographical location of Mussoorie plays a central role in understanding the current situation. The British chose a narrow mountain pass with limited natural springs because it was suitable for a small colonial town, not a large urban community. For this reason, the current environmental pressures on Mussoorie cannot be viewed in isolation from the historical decisions that shaped its original form.

The findings of this study have important policy implications. Recent recommendations by the National Green Tribunal, which include managing tourism based on carrying capacity, conservation of natural springs and more stringent controls on construction activities, do not simply attempt to address recent tourism pressures, but address long-term structural limitations that have existed for a long time. Mussoorie's experience also provides useful lessons for other colonial hill towns in the Indian Himalayas that face similar environmental and planning challenges.

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