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# Present Status of Government's Beautification Projects & Its Impact on the River Gomti across the Lucknow City

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**ABSTRACT:** Lucknow's cultural past, architecture, social life, economic growth and agricultural practices have always been intertwined with the River Gomti on whose banks the city developed, flourished and sustained since 18<sup>th</sup> century. Today, the river is severely polluted which makes it necessary to take proper mitigation steps to revive it. Government's Beautification Projects are a good example of administrative empathy towards the welfare of the "Lifeline of Lucknow". The present paper is an effort to study the Beautification Projects implemented by the Government of Uttar Pradesh on Gomti across the Lucknow city, the impact created by them on the condition of the river, delves deeper into the use of technology in reducing the Gomti River Pollution and suggest effective measures for the same. It highlights the vision of these architectural projects, thriving and functioning as cultural centres for more than three centuries yet failing to grab the attention of the researchers and scholars. The paper has been supported by the review of certified published reports and researches. The methodology incorporates an analysis of the Master Plan of Lucknow City, Open Series Map 63B/13 and satellite imagery for the temporal study of these projects and their impact on the river. The findings of the study depict the Government's Beautification Projects preserving the 'Nawabi' heritage, promoting tourism in the River Gomti but failing to control the Gomti River Pollution.

**KEYWORDS:** Beautification Projects by the Government of Uttar Pradesh, River Gomti, Impact of the Beautification Projects, Application of Remote Sensing, Temporal Study across Lucknow

## I. INTRODUCTION

Lucknow has been an important centre of culture, trade and administration since its existence as 'Oudh' - the capital of Awadh, of the United Province in British India and of the state of Uttar Pradesh in the Republic of India (Markel, S., 2010). The River Gomti in Lucknow is not only valued for its role in easy transit but cherished for its view, cool breezes and respected for its utility. Lucknow's history is intertwined with the Gomti playing an important role in the city's economic life as a meandering transportation route and the principal source of irrigation. In its social life, the riverbank has been a pleasant backdrop where the Nawabs build their palaces, representing Lucknow's architectural heritage (Nagpal, S. & Sinha, A., 2009). Today, the river is severely polluted, making it necessary to constantly monitor its water quality and the sources of pollution (Kumar, A., 2019). The Government and concerned authorities, through the Beautification Projects, aim to awaken local, ecological and environmental concerns. Most of these projects have little impact as people happily ignore them.

The research paper is an effort to study the Beautification Projects under the U.P. Government across the city of Lucknow, the present condition of their infrastructure and the impact casted on the river. The study delves deeper into the use of technology in reducing the Gomti River Pollution and suggest effective measures for a healthy River Gomti. It plays a significant role in highlighting the visions of these projects, thriving and functioning as important centres of heritage and culture for centuries. The paper includes the review of certified published reports and researches from the United Nations' World Urbanization Prospects and the Development Program's Human Development Report, the Intergovernmental Panel on Climate Change (IPCC), the Town and Country Planning Commission of India, the Lucknow Report, the Census of India (2011) and the Ministry of Housing and Urban Affairs.

### Objectives

- To study the vision of the Government's Beautification Projects.
- To study the impact of the Government's Beautification Projects on the River Gomti.
- To study the present condition of the Government's Beautification Projects.
- To study the local initiatives being taken to clean and revive the River Gomti.

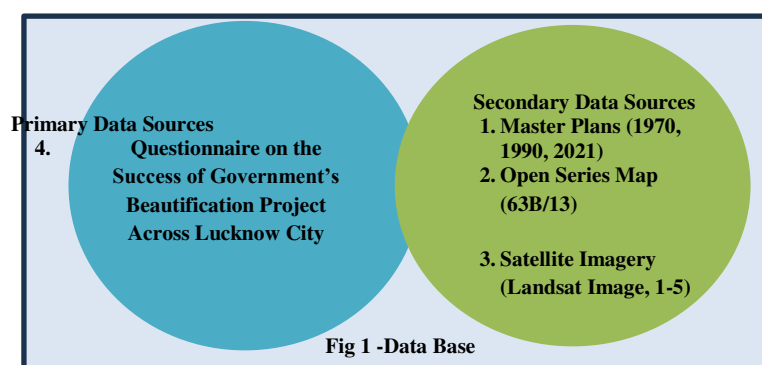
- To study the role of technology in cleaning and reviving River Gomti.
- To suggest technologically sound and mass-involving measures for a healthy River Gomti.

## II. RESEARCH METHODOLOGY

### Data Base

The research uses primary as well as secondary sources of information in its execution. The primary source measures the success of the Beautification Projects on the riverbank, using Structured Questionnaire as a tool, developed on the basis of significant aspects of the projects.

The secondary sources constitute statistical data from various reports and researches evaluating the need, expenditure, returns, sustainability and impact of the Beautification Projects on the River Gomti. It comprises the Master Plans of Lucknow city (from 1970 to 2020) and the Open Series Map numbered 63B/13 (*Survey of India*), making the Level 2 Data in the secondary source. The measurement of the positive and negative changes incurred by these projects in the infrastructure, health, water quality, tourism, river pollution and condition of the River Gomti over time is done through a temporal study of the satellite imagery using Remote Sensing.



### Methodology

A combination of quantitative and qualitative research methodologies is applied. The vision and impact created by the Government's Beautification Projects on the Gomti across Lucknow are derived from the secondary data through the Master Plans of Lucknow city (1970, 1990 and 2021) and reports published by the U.P. Government.

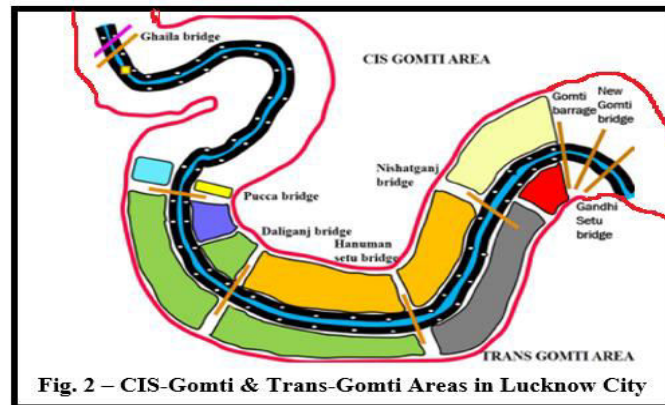
The primary data on the present status of the Government's Beautification Projects and the changes in the condition, water quality, tourism and river pollution of the Gomti is generated as Classified Images of the Landsat Satellite Imagery (1 to 5) and circulating online structured questionnaire to the localities in the city. The success of these projects in terms of popularity, tourism and pollution in the Gomti is evaluated by the responses to the questionnaire. To comprehend the measures employed to clean and revive the Gomti, the history, expansion and future prospects connected to the river in the city are viewed through the lens of different time periods using Remote Sensing.

### Review Of Literature

Lucknow has had numerous transformations from the 'Nawabi' lineage, the British control to the capital of Uttar Pradesh post-independence (Sarif, M.O. & R.D. Gupta, 2019). It is amongst the fastest-rising metropolitan cities in Central India (Census of India, 2011). In her book, author Veena Talwar Oldenburg describes "Lucknow, a place of beauty, romance, and heartbreak – built by the eponymous Nawab Saadat Ali Khan I in 1722, has the river Gomti entering from the eastern-most point in the city and looping lazily along a south-westerly direction."

The River Gomti, the 6<sup>th</sup>-order groundwater-fed tributary of the River Ganga, is the lifeline of the Central Ganga Plains. The total catchment of the Gomti river basin is 30,843 sq.km. (Shukla, A. & Jain, K., 2021). The 20 most prominent towns of Uttar Pradesh come under its basin, containing very fertile alluvium, favourable for all types of seasonal crops (Verma et al., 2013). The monsoon plays a major role in the supply of water and sediments to the Gomti. The banks of the river hold several architecturally and culturally rich tourist spots. According to a popular Hindu belief, bathing in the Gomti on 'Ekadashi' (the 11<sup>th</sup> day of the two lunar phases of the Hindu calendar) washes away sins. According to the 'Bhagavata Purana', the River Gomti is one of the five transcendental rivers of India. During the 'Kartik Purnima', 'Chatt Pooja' and other religious activities, the 'Kudiya Ghat' is packed with devotees to take a dip in the river. The Gomti divides Lucknow, geographically, into the Cis-Gomti, representing the city's Nawabian and British heritage, and the Trans-Gomti, witnessing the post-independence evolution. According to the report, 'Dynamics of Peri-Urban Areas: Prospects and Challenges of Sustainable Development – A Case Study of Peri-Urban Area of Lucknow',

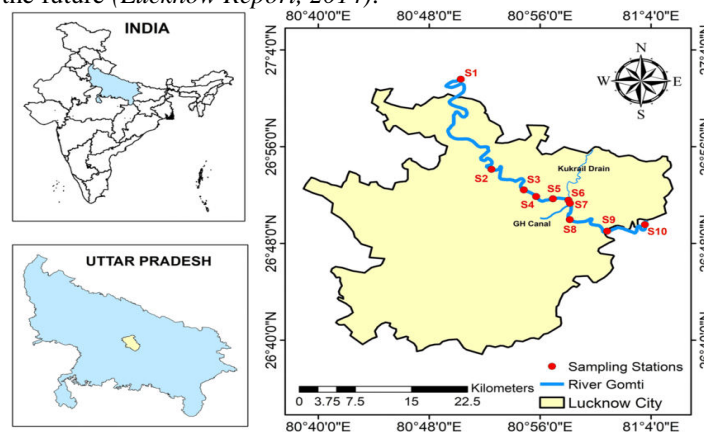
published in May 2020, the city, divided on the basis of growing urbanization into Old Lucknow and New Lucknow, demarcates significant differences in its aquifer systems (Foster, S. & Choudhary, N.K., 2009). The city extension in the Trans-Gomti area was an open, marshy land two decades ago, with a big, permanent ox-bow lake of the Gomti, the ‘Kathauta taal’ which now comes within the city boundaries (Farooqui, S. & Farooqui, A., 2020). “Lucknow has evolved from a tiny, isolated population center in the early 1990s to a huge, interconnected metropolitan agglomeration with various economic, physical, and environmental characteristics, today. The temporal and spatial features of land usage have dramatically changed.”- Ministry of Housing and Urban Affairs (2020)



### Study Area

Lucknow, the capital of U.P., is located on the 26.8465108 °N and 80.9466832°E coordinates with an area of 631 sq.km. The River Gomti is the city’s chief geographical feature. The city lies at an elevation of 123 m above mean sea level. The climate is Subtropical-Humid type with Cool, Dry Winters (mid-November to February) and Hot Summers (March to June) representing the climatic zone ‘Cwa’, according to the Köppen’s Classification (Mall et. al. 2016). The average annual rainfall is 896.2 mm. More than 90% of the rainfall occurs between June and October with an average rainfall of 827.2 mm from the South-West Monsoon. The frontal rainfall occurs during the winters from the North-East Monsoon when the temperature ranges from 3°C to 25°C. Fog is an extremely common phenomenon from mid-December to late January.

Lucknow is the ‘12<sup>th</sup> Most Populous Urban Agglomeration of India’ with a population of 3.5 million (Census of India, 2011). The city has been an important hub of governance, administration, finance, commerce, technology, aerospace, pharmaceutical, education, design, culture, tourism, music and poetry (Kumar, L. & Dubran, M., 2019). Situated in the centre of the Indo-Gangetic Plain, the city is surrounded by Barabanki on the east, Unnao on the west, Raebareli on the south, Sitapur and Hardoi on the north including villages and the orchard towns of Chinhat, Malihabad, Kakori, Mohanlalganj, Gosainganj and Itaunja. Urban growth is in sync with other cities of similar size and is expected to accelerate significantly in the future (Lucknow Report, 2014).



**Map 1 – Key Map of Study Area**

Lucknow is a well-known center of the ‘Ganga-Jamuni Tehzeeb’ - a unique cultural blend of the Hindu and the Muslim traditions fostering an environment of graciousness and courtly mannerism thriving as the ‘Awadhi’ culture.

Historically, Lucknow has played an important role in the First War of Independence, also known as the Sepoy Mutiny of 1857. The siege and defense during the uprising at the Residency are remembered as a heroic episode in the Indian History as it witnessed significant protests, movements and acts of civil disobedience.

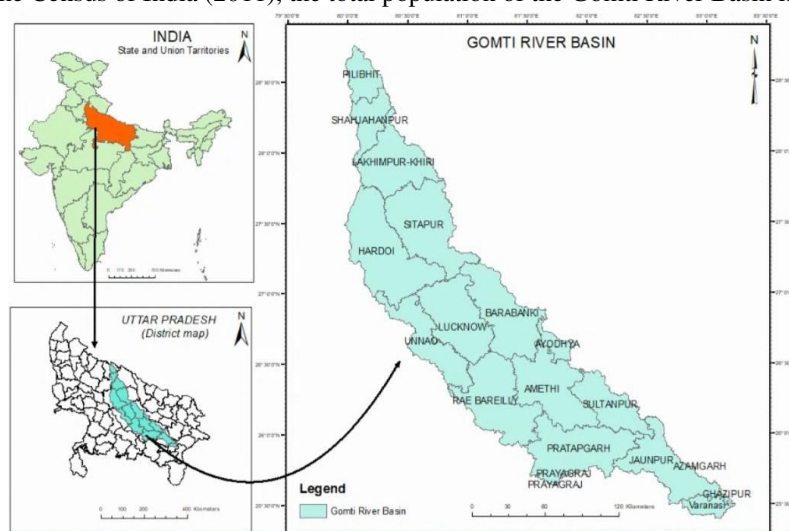
The city is adorned with numerous historical monuments exhibiting the influences of Mughal, Persian and Awadhi architectural styles. Prominent landmarks include ‘*Bara Imambara*’, ‘*Chota Imambara*’, ‘*Rumi Darwaza*’, Hussainabad Clock Tower and La Martiniere College. Lucknow is famous for its delectable ‘*Awadhi*’ cuisine with rich flavors, fragrant spices and unique cooking techniques. The Lucknow Mahotsav, the annual celebration of the city’s culture, art and craft, provides platform to the local artisans and performers to showcase talent, promoting the city’s legacy. Lucknow is the home to literary and intellectual activities, prestigious educational institutions as well as renowned poets, writers and scholars, contributing significantly to Urdu literature and poetry.

### The River Gomti

The Gomti, an alluvial river of the Gangetic Plain and a significant tributary of the River Ganga, originates near Mainkot from the ‘*Gomat Taal*’, also known as the ‘*Fulhaar Jheel*’ in Madho Tanda, 3 km east of Pilibhit situated at an elevation of 185 m. It flows through a valley southward crossing the major urban districts of Lucknow, Sitapur, Lakhimpur Kheri, Sultanpur and Jaunpur to meet the Ganga at the ‘*Markandey Mahadeo*’ temple in Kaithi, district Ghazipur after traversing 940 km, in the south and south-east direction. Various tributaries of the Gomti are Kalyani, Gachai, Sai, Jomkai, Barna, Chuha, Saryu, Giri and Kathna. The geographical extent of the Gomti sub-basin lies between 79°59’ to 83°14’E longitudes and 25°25’ to 28°40’N latitudes. The surface area of the basin is flat, sloping in a south and south-east direction with a varying altitude from 62 to 200 m above mean sea level.

The nature of the river is perennial. It has a sluggish flow throughout the year, except the monsoons when heavy rainfall causes multiple times increase in runoff. The River Sai is a major tributary with a drainage area of 12,900 sq. km., approximately 43% of the total catchment area of the Gomti basin. It is bordered by the Ramganga basin in the north-west, the Ghaghara basin in the north and north-east and the Ganga basin in the south, south-west and south-east directions. The Gomti basin covers 17 districts and 161 blocks of Uttar Pradesh.

The climate of the Gomti River Basin is Sub-Tropical and Monsoon type. The monsoon season is warm and humid accompanied by frequent heavy rainfall. The basin lies on thick alluvial sediments of the Quaternary Age, comprising of sand, silt, clay, boulders, gravels and kankars. The unconsolidated sediment may be subdivided into younger alluvium, occupying the contemporary-day flood plains and older alluvium, covering the elevated doab portions of the region. According to the Census of India (2011), the total population of the Gomti River Basin is 277.15 lakh.



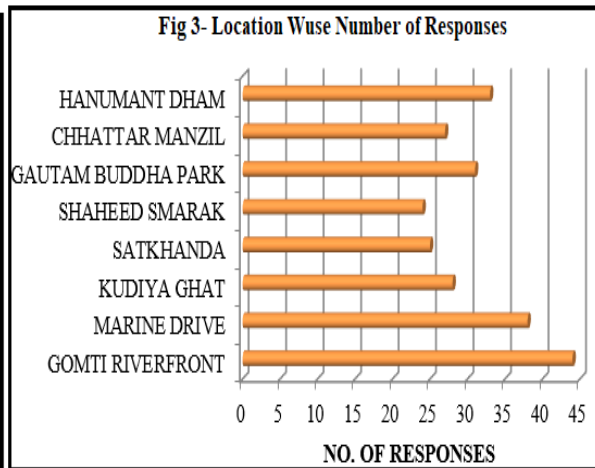
Map 2 – KEY MAP OF THE STUDY AREA – THE GOMTI RIVER BASIN

### Findings & Results

The findings of the study include the analysis and interpretation of responses to the questionnaire – “Success of Government’s Beautification Projects across Lucknow City” as the primary data collected from 250 subjects of different ages and occupations, spreading across the Lucknow city. The questionnaire covers aspects such as the present health of the Gomti and condition over time, the engagement of the respondents with the river and the success of the Government’s Beautification Projects.

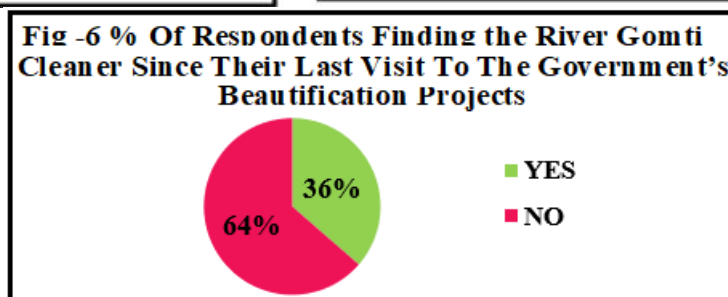
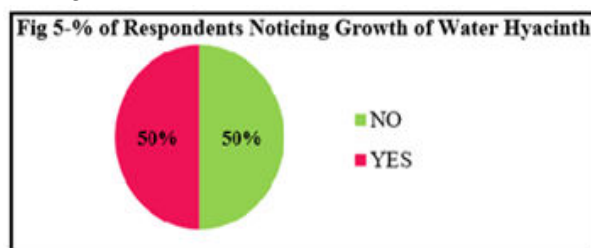
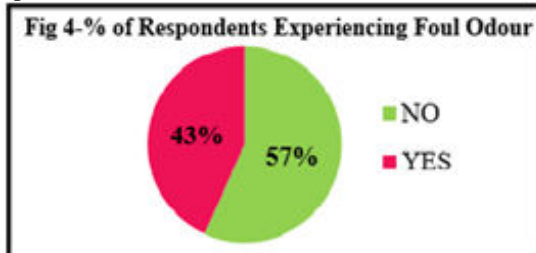
The Government’s Beautification Projects, architectural heritage and infrastructures located on the banks of the Gomti across Lucknow enhancing the beauty of the banks by demanding maintenance in return, are the highlight of the study. Refer to Table 1 & Fig 3.

| LOCATION           | NO. OF RESPONSES |
|--------------------|------------------|
| GOMTI RIVERFRONT   | 44               |
| MARINE DRIVE       | 38               |
| KUDIYA GHAT        | 28               |
| SATKHANDA          | 25               |
| SHAHEEDSMARAK      | 24               |
| GAUTAM BUDEHA PARK | 31               |
| CHHATTAR MANZIL    | 27               |
| HANUMANT DHAM      | 33               |
| <b>TOTAL</b>       | <b>250</b>       |



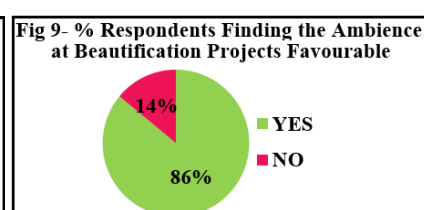
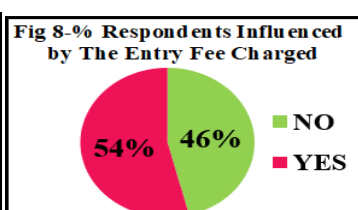
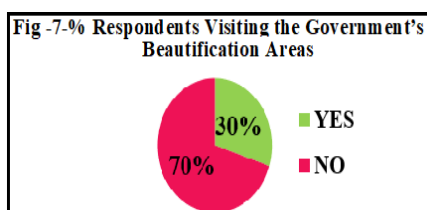
● **The Present Health of the Gomti & Condition Over Time**

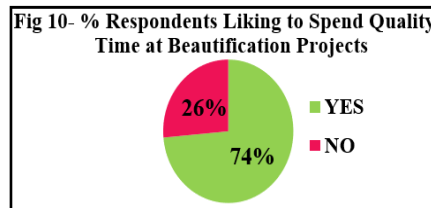
The parameter of the present health of the Gomti and condition over time included hyacinth growth and foul smell. According to the responses, larger number of people have experienced foul odour from the River Gomti and have the opinion that its condition has declined over time. Refer to Fig 4,5 & 6.



● **The Engagement of the Respondents with the River**

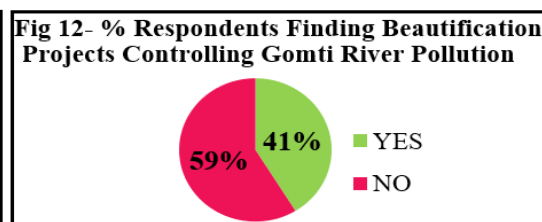
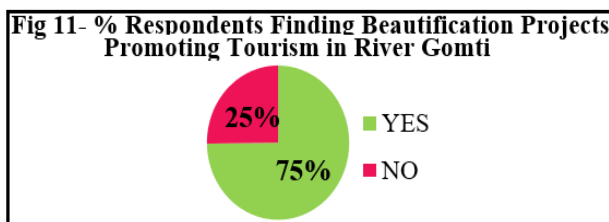
The parameter of the engagement of the respondents with the river included influence of economic factors, liking of the ambience and spending quality time on the riverbank. According to the responses, more people found the ambience favourable and spent quality time at the riverbank but larger number did not visit those locations very frequently and their frequency was influenced by the economic aspect of entry fee charged. Refer to Fig 7,8,9 & 10.





**• The Success of the Government’s Beautification Projects**

The parameter of the success of the Government’s Beautification Projects was assessed with respect to tourism promotion and pollution control. According to the respondents, larger percent agreed that the Government’s Beautification Projects promoted tourism along the banks of river but disagreed that the projects effectively controlled the Gomti River Pollution. Refer to Fig 11 & 12.



Thus, the findings depict a clear picture of the structures, under the banner of the Government’s Beautification Projects, not only preserving, conserving and restoring the ‘Nawabi’ heritage but also promoting tourism in the River Gomti, though lagging behind in controlling the Gomti River Pollution effectively.

**III. DISCUSSION**

Today, the Gomti is in a stage threatening its existence. Due to rapid development, the river’s current status is severe from an aesthetic, commercial and environmental standpoint (Kumar, P., 2018). Urbanization, industrialization and deforestation have adversely affected the qualitative and quantitative parameters of the Gomti (Gupta, N. & V. Devadas, 2013). The pollution level has reached a critical stage where the water quality does not match the ‘Drinking Water Standards’ of the WHO and the water level dropped by 2 inches below the normal level of 346.7 ft owing to the intensively high temperatures in May and the lack of water supply. The Gomti’s pollution level, ranging between moderate and high throughout its course, has been assigned the ‘Class-B’ status by the Uttar Pradesh Pollution Control Board (UPPCB, 2015).

Large amount of waste is discharged into the river as its covers highly populated regions (The Times of India, 2012). The major sources of pollution include unplanned municipal waste, idol immersion and plastic bags (Kumar, A., 2019). The increased industrial activity and exponential growth of Lucknow on the Gomti are harming the water quality and biodiversity. Problems of encroachment of wetlands and lakes, frequent floods in low-lying residential areas, depletion of the main hydrological features that recharged the underlying aquifer and lack of sewage treatment plants further deteriorate its condition (Kumar et al., 2014). 25 drains in Lucknow city pour their untreated sewage, domestic and industrial waste directly into the river and the Gomti Barrage converts it into a lake at the downstream end (Srinivas, A., 1996). Over time, the Gomti has become more of a backwater (Tripathi, M & Singal, S. K., 2020). The authorities need to address the issue of the Gomti River Pollution urgently with proper management, action and sustainable solutions (Kumari, R., 2014).



**Fig. 13 – GOMTI IN LUCKNOW**

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