

# **INTEGRATED ECO-SENSITIVE APPROACH TO GENERATE RIVER RELATED ECONOMY– A CASE OF GOMTI RIVERFRONT, LUCKNOW**

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## **ABSTRACT**

River Gomti, the lifeline of Lucknow city in state of Uttar Pradesh in India, is degrading rapidly and needs urgent intervention. This project aims to ‘create a sustainable eco-management plan’ (Ecological & Economical), with a focus on overall development. Environmental, social and economic benefits will not only increase the environmental sustainability of the waterfront, but also boost up the entire city’s economy in an inclusive and integrated manner. Economic development need not come at the cost of the environment. Sustainable economic development is achievable by harmonizing all environmental considerations. The ecocity concept is an integrative and comprehensive approach, aiming not only to the rehabilitation of the urban river according to ecological principles but also to be an integrative part of the city itself. Therefore, the urban river is treated in harmony with the principles of an ecocity. Integration, on the other hand, involves planning, upgrading and beautification of the urban river and its surroundings together with other focal urban landscape elements like major centers, major historical sites, etc. In this sense, the context of integration is also enriched as it now includes accessibility, connection and going beyond them includes the planning of all image makers of the city in an integrated whole.

**Keywords:** Ecocity, Sustainable, Urban River, Planning, Ecological

## Introduction

Flowing waters, such as rivers, are the lifeblood of most cities – providing transportation, security, electricity, irrigation, trade, and recreation. Rivers are degrading rapidly and needs urgent intervention. Channelization of rivers, along with beautification and structured designated landscape design along the riverbanks, are parts of the development that occur in the urban centers around the world.

Figure STYLEREF 1 \s 1. SEQ Figure \\* ARABIC \s 1 1  
Urban River



(Landscape Journal Of India, 2014)

Realizing the importance of ecological aspect, many developed countries all around the world have started to encourage and pull out their effort in developing the ecological riverfront. They have started to give back the land to the river. Economic development need not come at the cost of the environment. Sustainable economic development is achievable by harmonizing all environmental considerations.

## Need for Study

Cities have been a **major part of the problem** and will have to be part of the solution as well. **Manifesting city's nature** with urban economic development to project **city holistically as** waterfront city with attractive investment opportunity to further enhance the economic growth and stability and to stablish city as one of the major tourism attraction centers by making an **excellent living environment and** increasing the **overall living standard** of the people in the cities containing riverfront.

Figure 1. Social Spaces around river



## Advantages of riverfront Development

**Water conservation practices** define that the development of projects would ensure a proper design of projects in conserving river and maintenance of rivers flowing through large cities. Beautification of the riverfront with a natural outlook will provide the public with an open space for leisure and recreation. **Habitat protection and restoration** is another aspect which includes conservation of water in the river Human/Environmental connections conservation and development of land and conservation of flora and fauna through the maintenance of river bank. It can be a great Source of revenue for government in terms of taxes from the commercial activities in the region. The commercial activities will include shops, restaurants, sport activities, transportation, boating etc. which can be leased out or giving to private players to operate.

**Development of tourism in the region** can be increased by offering a variety of attractions like water sports, entertainment arenas, parks, shopping areas, etc. which will act as a great economic spin-off with the rise in the property value in and around the region, acting as a catalyst for redevelopment and renewal of nearby places. It will generate **Employment opportunities** for nearby people as with the development of riverfront there would be creation of jobs as it gives way to starting up of a host of commercial activities in that region and also indirect job creation associated with the set of activities. Encouraging **recreational activities** like walking, jogging, biking, sports activities, etc. will also Improve **quality of life** of nearby community by revitalizing the neighborhood

## Benefits of riverfront Development

- **Environmental Benefits**

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Environmentally sensitive urban riverfronts refer to concepts and projects which are sensitive to local hydrology, environmental and ecological considerations by putting primary focus on conservation, restoration and enhancement of river and associated ecosystems. Some environment benefits include; Rich biodiversity, Clean air, Clean water and Improved ground water

### ○ **Economic Benefits**

- Improved livelihood opportunities
- Tourism growth
- Attractive investments (Source of Revenue)

Figure STYLEREF 1 \s 1. SEQ Figure \\* ARABIC \s 1 3 Tourism around river



(ArchDaily, 2020)

### ○ **Social Benefits**

Socially inclusive urban riverfronts are riverfronts with adequate considerations of the needs and aspirations of all local stakeholders, custodians and users of river and riverfronts throughout the planning, development and operational phases of such riverfronts.

- Vibrant spaces for interactions and events
- Serene and scenic picnic spot

## **Aim**

To create a sustainable eco-management plan' (Ecological & Economical and social), for Gomti riverfront area in Lucknow with a focus on overall development.

## **Objective**

- To assess the interaction between the city and river through articulation of environmental, social, economic and heritage profile.
- To study the guidelines and norms related to the riverfront development.
- To study and formulate various models of economy generation through riverfront projects.
- To propose a comprehensive plan with specific strategies for economy generation.

Figure STYLEREF 1 \s 1. SEQ Figure \\* ARABIC \s 1 4 River Vibrant Zone





(Landscape journal of India, 2014)

## Vision

- The river will be able to support a habitat for riverine biodiversity to thrive.
- The river will provide opportunity for economic development.
- The river will be celebrated among the citizens.

## Scope

- To **recommend various interventions** in terms of economy generation model for the riverfront development project in urban areas with an eco-sensitive approach.
- Integrate river sensitive norms & practices** into long term planning of the city.

## Limitation

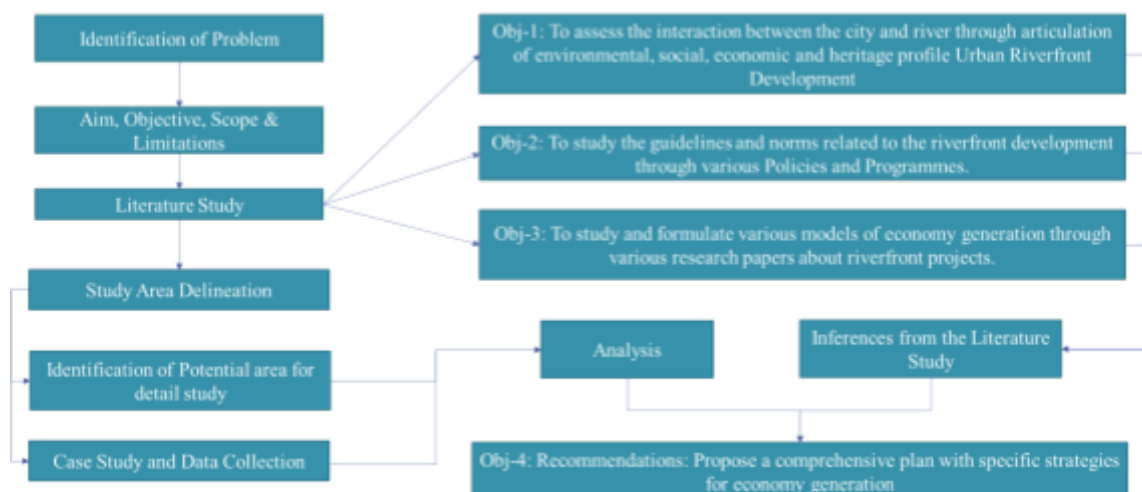
- The recommended projects may not be an ideal approach towards economy generation model. Hence, the research focuses to be contextual
- Case studies may have elements that might not be feasible in the chosen context.
- Only about 2 kms stretch along the heritage area in Lucknow would be considered.

## Research Problems

- What is the river related **economy generation models** and how **stakeholder participation** can play a major role that can be applied with an eco-sensitive approach?

## Methodology

Figure STYLEREF 1 \s 1. SEQ Figure \\* ARABIC \s 1 5 Methodology



# Integrated Eco-Sensitive approach to Generate River Related Economy– A Case of Gomti River, Lucknow

*(Author, 2021)*

## **Introduction to Study area**

Lucknow city is surrounded by its rural towns and villages like the orchard town of Malihabad, historic Kakori, Mohanlalganj, Gosainganj, Chinhat, Itaunja. On its eastern side lies Barabanki District, on the western side is Unnao District, on the southern side Raebareli District, and on the northern side the Sitapur and Hardoi districts. The Gomti River, the chief geographical feature, meanders through the city, dividing it into the Trans-Gomti and Cis-Gomti regions. Lucknow city is in the seismic zone III.

Lucknow has a warm humid subtropical climate with cool, dry winters from December to February and dry, hot summers from April to June. The rainy season is from mid-June to mid-September, when Lucknow gets an average rainfall of 896.2mm (35.28 in) from the south-west monsoon winds, and occasionally frontal rainfall will occur in January. In winter, the maximum temperature is around 25°C (77°F) and the minimum is in the 2-to-3-degree Celsius range. Fog is quite common from late December to late January. Summers are extremely hot with temperatures rising to the 40 to 45°C range.

## **Location**

Lucknow, the capital of Uttar Pradesh is situated 23 Mts. above sea level. It is situated on 26°30'-27°10' North latitude and 80°30'-81°13' East longitude. Lucknow covers an area of 2528 km<sup>2</sup>. It is surrounded on the eastern side by District Barabanki, on the western side by district Unnao, on the southern side by Raebareli and on the northern side by Sitapur and Hardoi districts. City is located on the north-western shore of Gomti river, which flows through the city. Some of the tributaries of this river are Kukrail, Loni, Beta etc. Sai river flow from the south of the city and in the east enters district Raebareli.

Lucknow is accessible from every part of India through Air, Rail and Road. It is directly connected with New Delhi, Patna, Calcutta, Mumbai, Varanasi, Bangalore, Thiruvananthapuram and other major cities by Chaudhary Charan Singh airport.

## **Site**

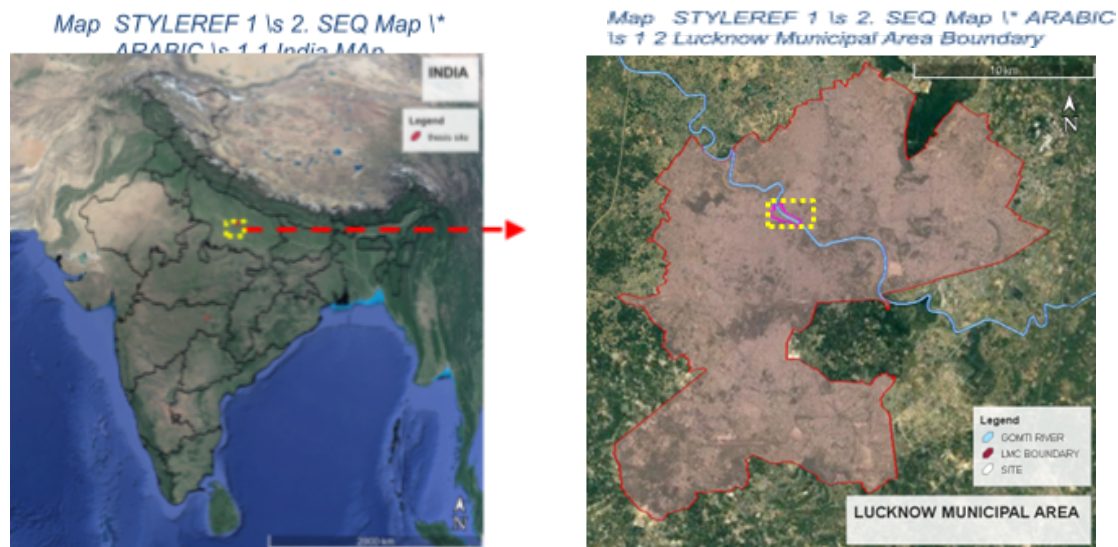
The chosen project site presents multiple opportunities for an inclusive integrated redevelopment. However, the absence of immediate planning interventions would threaten to irreversibly damage the heritage of the area.

### **Justification for site Selection**

The site, contains very special character in itself as it is located along the heritage zone of Lucknow, which suggests that probably this was where the oldest settlements along the river had started. Not much attention is given to this stretch and least action being taken to revive this river stretch which has a strong potential to be linked to the heritage zone which shall act as a major tourist attraction and can contribute to a good percentage of revenue generation through tourism.

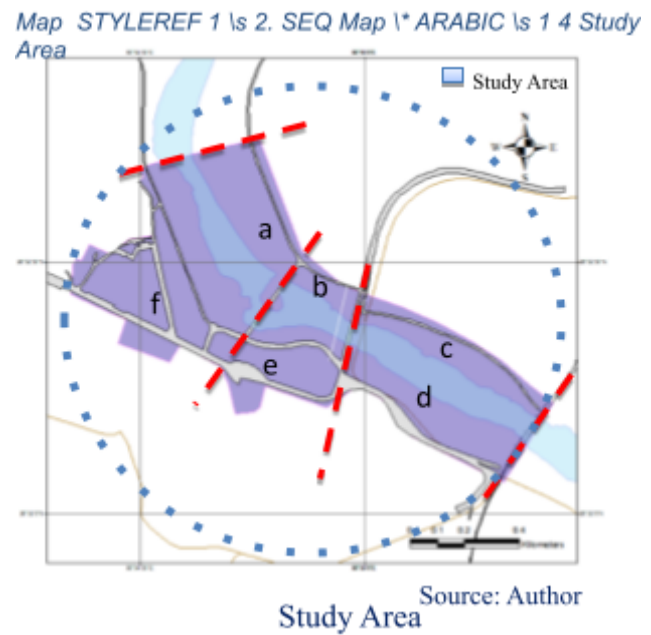
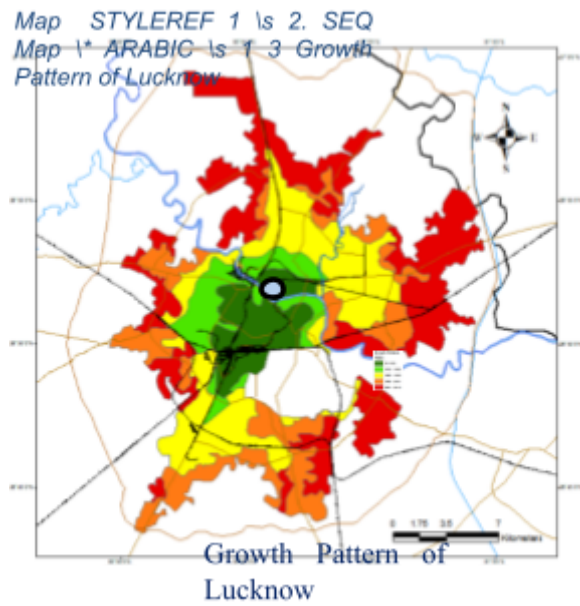
This is the part that has the maximum opportunity with barren land parcels left underutilized which houses several informal activities which are being practiced along the river. The Indigenous Inhabitants can be made stakeholders with formalization of their informal activities along the river edge. These will include the fishermen, Washermen, Boatmen, Cattle herders, etc. Open dumping sites and open defecation is creating unhygienic living conditions for residents.

## Integrated Eco-Sensitive approach to Generate River Related Economy– A Case of Gomti River, Lucknow



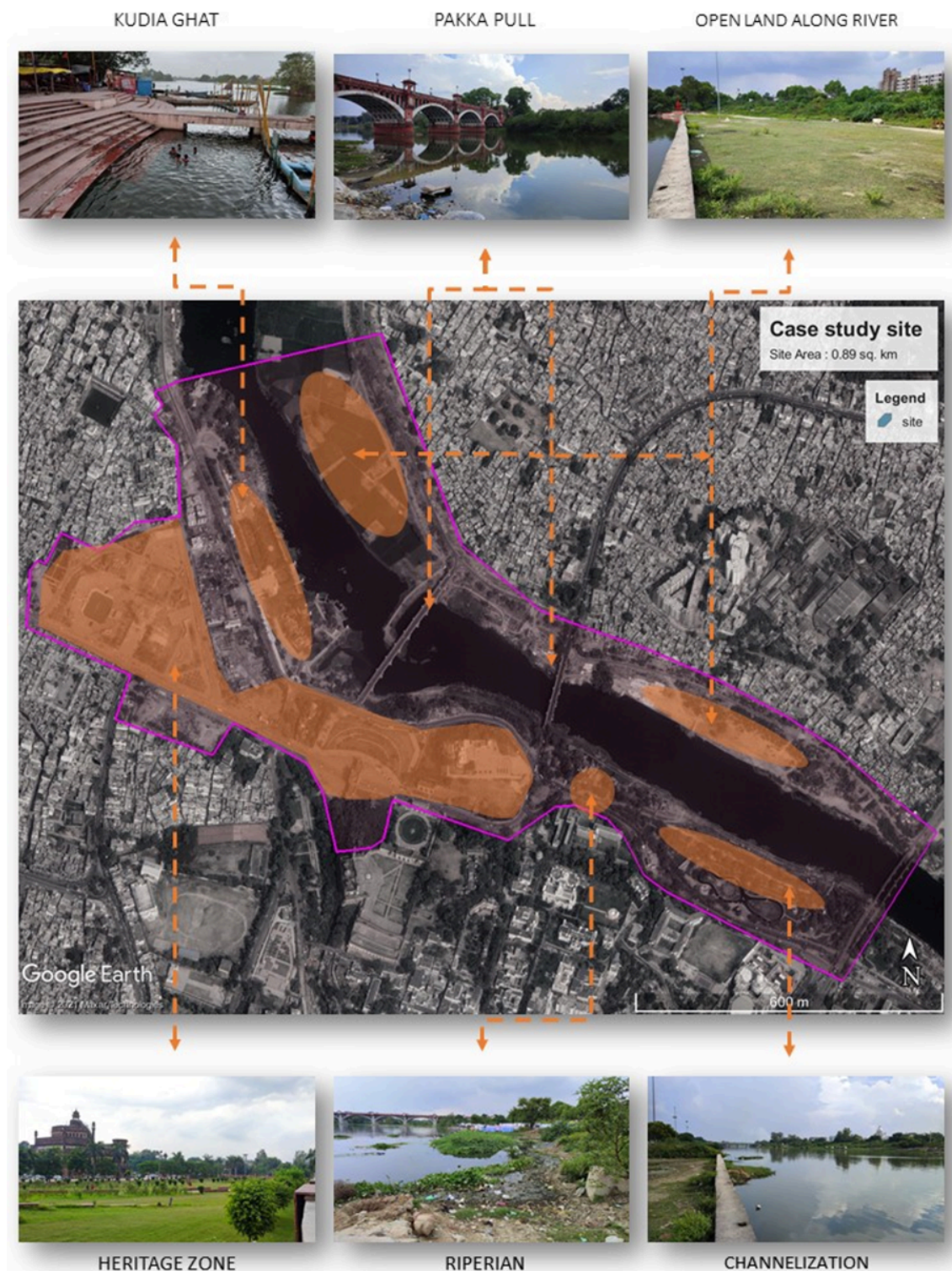
(City Development Plan, 2014)

Integrated Eco-Sensitive approach to Generate River Related Economy– A Case of Gomti River, Lucknow





## Integrated Eco-Sensitive approach to Generate River Related Economy– A Case of Gomti River, Lucknow



(Author, 2022)

The above map is the blow-up of the case study site with a magenta outline which accommodates an area of about 0.89 Sq. Km. Relevant site pictures taken recently has been attached to each of the land parcel to identify the issues and find potential solutions.



## Tourism

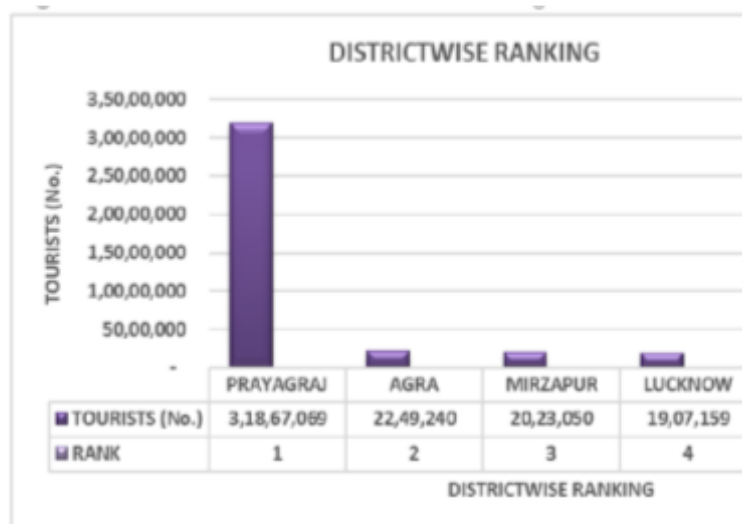
Tourism is the only industry which is privately driven leading to job opportunities created in every nook and corner of the country. With a multiplier of 1.9236, direct and indirect contribution of tourism to Gross value added (GVA) was estimated at 5.35% in 2015–16. The direct and indirect share of tourism employment to the total employment comes out to be about 12.38%.

Figure 1.2 Tourist Places in Lucknow



(uptourism, 2020)

Graph 1.1 District wise total tourist footfall ranking in UP



(uptourism, 2020)

## Integrated Eco-Sensitive approach to Generate River Related Economy– A Case of Gomti River, Lucknow

Graph STYLEREF 1 \s 2. SEQ Graph \\* ARABIC \s 1 2 Annual Tourist Visit Statistics in Lucknow



(uptourism, 2020)

**Inference: Average Annual tourist footfall based on past 5 years is 41 lakhs.**

Table STYLEREF 1 \s 2. SEQ Table \\* ARABIC \s 1 1 State wise Domestic Tourist Ranking in 2020

Rank	State/UT	Domestic Tourist Visits in 2020	
		Number (crore)	Share(%)
1	Tamil Nadu	14,06,51,241.00	23.0
2	Uttar Pradesh	8,61,22,293.00	14.1
3	Karnataka	7,74,53,339.00	12.7
4	Andhra Pradesh	7,08,28,590.00	11.6
5	Telangana	3,99,97,001.00	6.6
6	Maharashtra	3,92,34,591.00	6.4
7	West Bengal	2,88,41,732.00	4.7
8	Madhya Pradesh	2,35,19,632.00	3.9
9	Gujrat	1,94,64,517.00	3.2
10	Punjab	1,66,92,197.00	2.7

Source: India Tourism Statistics, 2021

(uptourism, 2020)

**Inference: UP is 2<sup>nd</sup> most visited tourist destination by domestic tourists**

Table STYLEREF 1 \s 2. SEQ Table \\* ARABIC \s 1 2 State wise Foreign Tourist Ranking in 2020

Rank	State/UT	Foreign Tourist Visits in 2020	
		Number	Percentage Share (%)
1	Maharashtra	12,62,409.00	17.6

(uptourism, 2020)

## Methods

### Indigenous Occupations Interview

#### ○ Fishermen

Fishermen: One of the Stakeholders. There was a massive flood in Gomti river in 1960s and later in 1970s after which the government finally decided to resettle the riverside inhabitants just 100-200 metres to the landward side in 1974. 52 plots of 600sq.ft (20'x30') each were allotted to families who were resettled to the landward side apart from the families who were provided monetary benefits. Some of the fishermen also own boats which is the side activity.

Figure STYLEREF 1 \s  
2. SEQ Figure \s  
ARABIC \s 1 3 Author  
with a Fisherman



Mathura prasad  
(Fisherman), Author

#### ● Problems And Issues Identify:

Reduction of water flow: Resulted in reduction of the fish flowing upstream and hence the livelihood of the fishermen have been threatened. Construction of new Hardinge bridge: Introduction of ford to reduce the flow of river for the construction of new bridge in the recent 5-6 years. Inconvenience of Occupation: the decline of their work is the They now have to travel 2-3 kms downstream to hunt for fishes which takes them longer to catch fish. Loss of income: Sometimes they have to return empty handed due to no fish or they have gone so far that they cannot row back home and choose public transport to get back. The boating activity can be improved and has the opportunity to be turned into a potential future tourist attraction

#### ○ Washermen

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Another Stakeholder Group. They are non-residents but their livelihood is dependent on the river totally. They travel 0-1, 2-4 or even 5-6 kms to reach the river bank to wash clothes. They bring clothes from nearby private hospitals, or from Rakabganj cloth market in old Lucknow. Bring about 50-100 clothes to wash every day. Average Earning is 400-500 per day

- PROBLEMS AND ISSUES IDENTIFIED:

Figure STYLEREF 1 \s 2. SEQ Figure \\* ARABIC \s 1 4 Author with Washermen



Washermen (Hori Lal, Sonu, Barati Lal), Author, 2021

Creation of ford due to which the river flow has reduced

Fish market nearby dumps the leftovers along the river which creates unhygienic conditions.

Cattle herders sometimes bring buffaloes which is disturbing

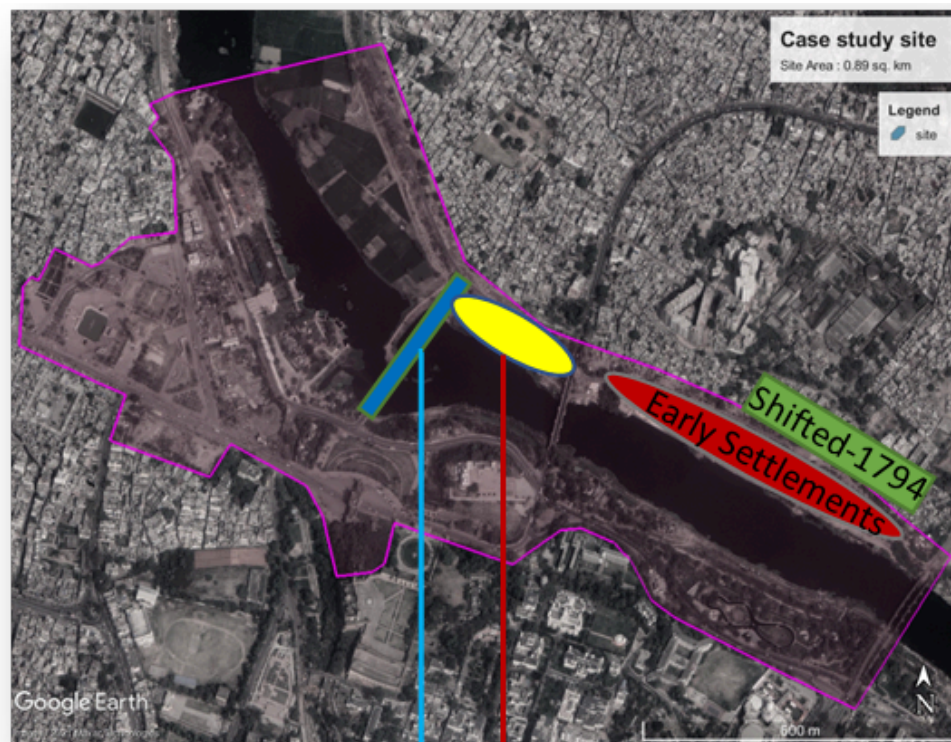
There are dedicated permanent space provided by the govt. for washermen along the river near kudia ghat (South bank) but the washermen are scared to go as there is HT cable passing just above it.

Other place near Dubagga (upstream) houses permanent washing facility provided by the govt. which is away from the river bank and has water pumps for washing.



# Integrated Eco-Sensitive approach to Generate River Related Economy– A Case of Gomti River, Lucknow

Figure STYLEREF 1 \s 2. SEQ Figure \\* ARABIC \s 1 5 Detail of Various Sites of Existing community



New Hardinge Bridge,  
(Gomti Riverfront, EIA Report, 2018)



Fish Market, Author, 2022



Old Fishermen Settlement,  
Author, 2022



Gomti river Lucknow, Author, 2022



Open land along river, Author, 2022



Washing Area, Author, 2022

o **Semi-Structured Interviews with the tourists.**

- i. Tourists – Another Stakeholder Group
- ii. Mostly domestic Tourist
- iii. Visit for a day Mostly.
- iv. Would like to visit the riverfront and spend 2-3 hours in boating and other activities around the river bank.
- v. Are willing to spend some money for the activities around riverbank.
- vi. Could be included in the tourism package for a day also.
- vii. A Tourist Information centre should be developed so as to orient the tourists and brief them about things.
- viii. Decentralization of TIC could also be done.
- ix. Parks and garden spaces can be increased around the riverbank so that it attracts more visitors.
- x. Better connectivity from the heritage zone to be made.
- xi. Will benefit the locals by generating employment opportunities.

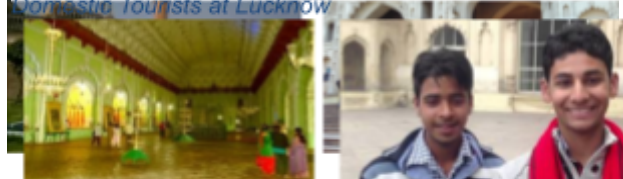
Figure STYLEREF 1 \s 2. SEQ Figure \\* ARABIC \s 1 6 Tourist group from Lucknow



Tourist Group from Lucknow Univrsity

Author, 2022

Figure STYLEREF 1 \s 2. SEQ Figure \\* ARABIC \s 1 8  
Figure STYLEREF 1 \s 2. SEQ Figure \\* ARABIC \s 1 7  
Domestic Tourists at Lucknow



Bara Imambada, Author, 2022

Tourist (Asif & Amit), Author, 2022



## Integrated Eco-Sensitive approach to Generate River Related Economy– A Case of Gomti River, Lucknow

### ○ Interviews with the Tourist Guides.

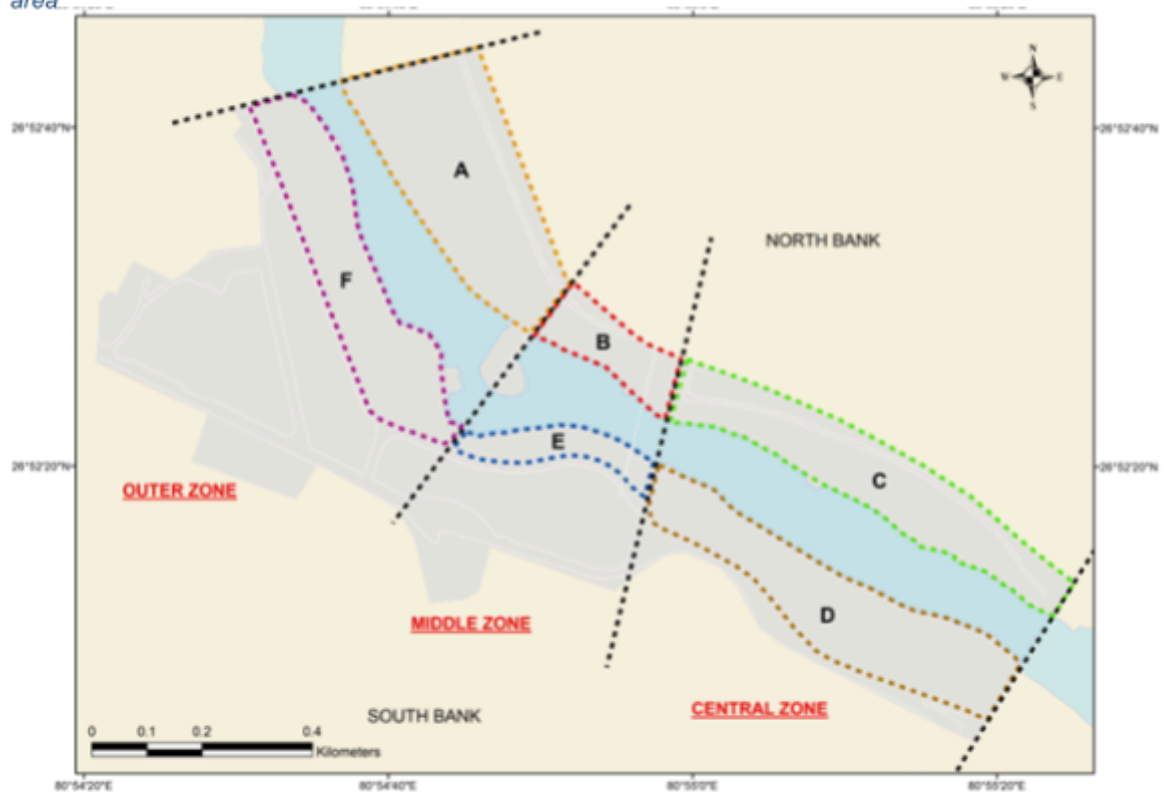
- i. Tourist Guides –Stakeholder Group
- ii. Non-residents but, Livelihood is dependent.
- iii. They travel 0-1, 2-4 or even 5-6 kms to reach the the heritage area at Husainabad complex.
- iv. They travel to work here for minimum wages but are satisfied during thwe months of October to March.
- v. Average Earning is 400-500 per day as some of them also manage to earn on their own apart from the fixed guide charges.

Map\_STYLEREF 1 \s 2. SEQ Map \\* ARABIC \s 1 5 Study area with Highlighted Heritage zone



# Integrated Eco-Sensitive approach to Generate River Related Economy– A Case of Gomti River, Lucknow

Map STYLEREF 1 \s 2. SEQ Map \\* ARABIC \s 1 7 Map Showing the sub-division of zones in the study area



Division of Study area into Sub Zones

Author, 2022

Map STYLEREF 1 \s 2. SEQ Map \\* ARABIC \s 1 6 Study area with Road Network



Route Map of Husainabad Complex and Study Area

Author, 2022

## Result

### Way Forward

#### Three aspects of the Development:

- Ecological
- Economic
- Social

*Figure 3. Integrated Development including major aspects*



### Potential Interventions based on the Analysis and the site study:

- |   |                                |
|---|--------------------------------|
| i. Riparian Buffer                      | : Ecotonal Strips              |
| ii. Safeguarding indigenous inhabitants | : Formalizing Activities       |
| iii. Enhancing Public Accessibility     | : Social spaces                |
| iv. Tourism Economics                   | : Recreation                   |
| v. New economy generation               | : Herbariums/Botanical Gardens |

Various projects that will be a part of integrated Ecocity would be as mentioned below.

**Riparian Buffer:** To preserve and improve biodiversity, provide ecosystem services, ecological restoration, increase the potential of habitat corridors, improve public trail access, provide open-space amenities, and educate students about the environment, a buffer zone will be created around riverside open spaces. In order to decrease concentrated flows to the water body and to maintain habitat for birds and other wildlife species that need uninterrupted access to food, shelter, and water, the riparian corridor should be unbroken. The most crucial component of a riparian corridor is a tree because they remove nutrients, stabilize the soil, change the temperature of the water, and feed aquatic species. Riverbanks are a crucial interface for river hydrology, riparian support systems and waterfront activities for example soft edges may be developed as shallow banks with floodplain vegetation, steep banks with planted vegetation, mown and trampled earth banks with invasive vegetation.

**Safeguarding indigenous inhabitants:** Stakeholders and the community participation through Perpendicular connections, will extend the grid of the community into the park and natural systems, linking the urban grid to the natural forms of the waterscape and landscape. A fishing pier can be developed along with a demarcation of dedicated fishing zone to formalize the fishing activities so that the fishermen community who are dependent on these activities for their livelihood will not be displaced anywhere. Apart from them the washermen community will also retain their daily routine through formalizing the washing activity by channelizing the river water into an inland reservoir where they can wash clothes and then the water can be reused for irrigation and maintenance of riparian zone along the river.

**Enhancing Public Accessibility:** Even where they run alongside privately developed regions that can be expanded through land value capturing in these places, connections from buildings and districts to the rivers should be open to the public. Both temporary and long-term installations of public activities and events, such as sidewalk cafés, street festivals, and vendors, will liven up the links. Major parallel connections will be planned as one continuous space, with the landscaping defining the street's personality.

**Tourism Economics:** Heritage tourism to be linked with the river economy by developing an information centre for the tourists (specially first timers) and linking both the river edges through water ferries that will also add to character value of the place. These ferries can further be connected to other heritage sites in the city in the upcoming phases of the development. Pedestrianization of the heritage zone and developing a non-motorized zone within the heritage zone can also add value to the environment and safeguarding the heritage.

**New economy generation:** Developing blue-green infrastructure will generate new avenues of economy and earning potential for the city. Improved waterfront urban design, creation of active and passive recreation spaces such as horticultural and botanical gardens and herbariums will attract citizens to frequent the area. A small park, boat launch, stormwater landscape or fishing pier, created at the right time and embraced by the community, can have a catalytic effect and lead to bigger things down the road. Increased footfall enhances economy but threatens the

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environment – hence strict guidelines will be formulated and implemented to ensure cleanliness and sustained maintenance of the proposed area.

Successful riverfront development doesn't have to start on a grand scale. Sometimes the smallest projects are the most potent.

Various projects have been highlighted are as follows:

1. Riparian Buffer
2. Safeguarding indigenous inhabitants
3. Enhancing Public Accessibility
4. Tourism Economics
5. New economy generation

Together these five identified projects (in the short- and long-term) will have a pulsar effect on the economy of the Gomti waterfront, as well as the Heritage district of Lucknow. It will revitalize the livelihoods of the indigenous populations of the area (fishermen, washermen, cattle-grazers, etc.) as well as improve their overall quality of life. New avenues of revenue generation, as identified earlier, will provide a great uptick to the overall economy of the region.

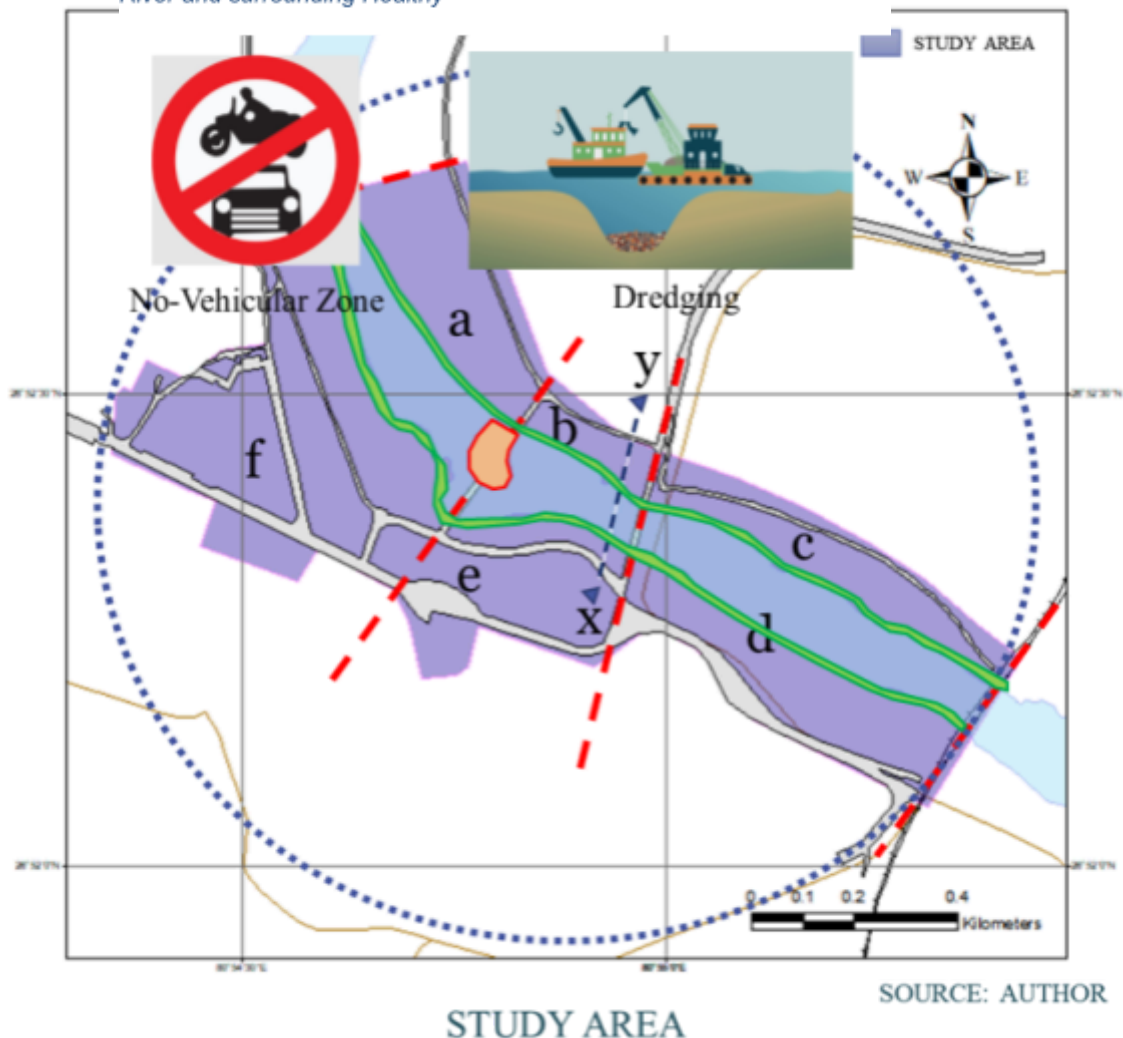
## Conclusion

### Physical interventions:

Dredging by sustainable modern techniques by creating a water edge development. Reduction the expanse of the temporary fords created around the pillars of the new bridge. Clear the water Hyacinth and clean the stagnant floating garbage. Create a riparian buffer with ecotonal strips. Pedestrianize the entire stretch along both sides of the river create necessary parking areas and provide innovative night lighting.

## Integrated Eco-Sensitive approach to Generate River Related Economy– A Case of Gomti River, Lucknow

Map STYLEREF 1 \s 3. SEQ Map \\* ARABIC \s 1 1 Map Showing Major Physical Interventions  
Figure STYLEREF 1 \s 3. SEQ Figure \\* ARABIC \s 1 3 Steps to make  
River and surrounding Healthy



- **New economy generation by increasing footfall & revenue**

Figure STYLEREF 1 \s 3. SEQ Figure \\* ARABIC \s 1 2 Physical  
Interventions to be done at site



**Ford Clearance**



**Cleaning Water Hyacinth**



## Integrated Eco-Sensitive approach to Generate River Related Economy– A Case of Gomti River, Lucknow

- i. Tap the tourist potential creating a tourist awareness/information centre, and engaging them in recreational activities like boating, etc.
- ii. A water ride-based amusement park and a botanical garden (herbarium) along the river bank on the barren chunks of land (see fig...)
- iii. Urban design and landscaping with pavilions, gazebos and food stalls to ensure revenue generation from tourists and local visitors.

Figure STYLEREF 1 \s 3. SEQ Figure \\* ARABIC \s 1 4  
New Economy Generation strategies in the riverfront



Water Sports

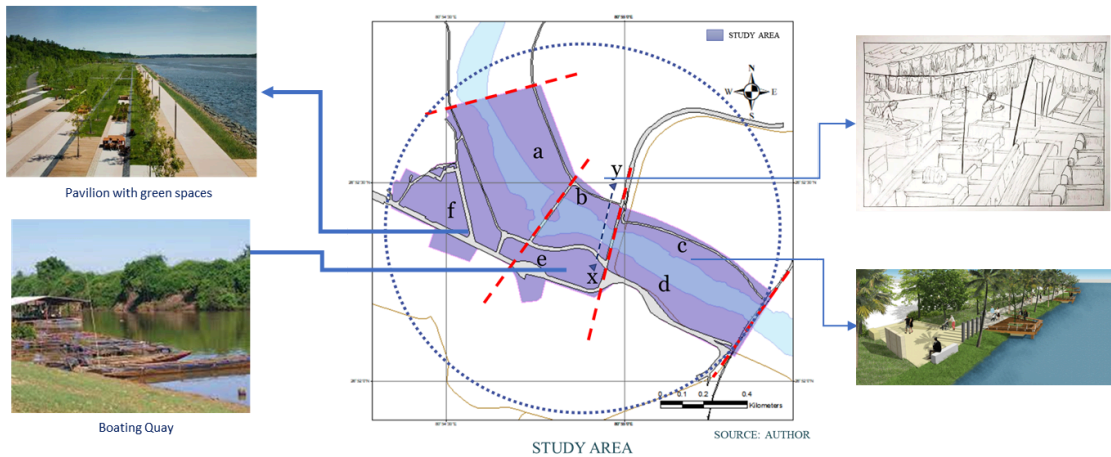


Botanical Garden/ Herbarium

### ○ **Safeguarding Indigenous occupations:**

- i. Fishermen: Upgrade and improve the physical conditions of their zone of operation, with platforms and pavilions (North bank)
- ii. Boatmen: Create a safe & user-friendly quay and ticket booth to encourage and promote the boating activities for the tourists.
- iii. Washermen: Create a backwater channel on the north bank with a STP, to ensure that washing activity gets necessary water supply, but waste water is not dumped back.

## Integrated Eco-Sensitive approach to Generate River Related Economy– A Case of Gomti River, Lucknow



### ○ Tourist Guides:

Creating an opportunity for local guides to expand their domain of income, by including riverside tourism as a part of their existing heritage circuit

*Map STYLEREF 1 \s 3. SEQ Map \\* ARABIC \s 1 2 Map Showing Final details of Design interventions along the river*



## Integrated Eco-Sensitive approach to Generate River Related Economy– A Case of Gomti River, Lucknow

Figure STYLEREf 1 \s 3. SEQ Figure \\* ARABIC \s 1 6 Interventions proposed on the North Bank of the Gomti river



TOURIST INFORMATION CENTRE



DHOBHI GHAT



NEW HARDINGE BRIDGE



DECK ALONG RIVER



HERBARIUM AND GARDEN

Figure STYLEREf 1 \s 3. SEQ Figure \\* ARABIC \s 1 5 Interventions proposed on the south bank of the Gomti river



PAVILION WITH GREEN SPACE



KUDIA GHAT



HERITAGE ZONE



HERITAGE ZONE



BOTANICAL GARDEN

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## Conflict of Interest

The authors declares no conflict of interest.

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