RIVERFRONT DEVELOPMENT OF ALLAHABAD - 'The Kumbh City'

A DISSERTATION

Submitted in partial fulfilment of the requirements for the award of the degree of

MASTER OF URBAN AND RURAL PLANNING

By

SAUMYA AGRAWAL

DEPARTMENT OF ARCHITECTURE & PLANNING
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE
ROORKEE - 247 667 (INDIA)
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CANDIDATE'S DECLARATION

I hereby certify that the work, which is being presented in the dissertation, entitled **Riverfront Development of Allahabad-'The Kumbh City'**,in partial fulfillment of the requirements for the award of the degree of Master of Urban and Rural Planning submitted to the Department of Architecture and Planning, Indian Institute of Technology Roorkee, Roorkee is an authentic record of my own work carried out during the period from August 2007 to May 2008 under the supervision of Dr. Ashutosh Joshi, Assistant Professor, Department of Architecture and Planning, IIT Roorkee, Roorkee.

The matter embodied in this dissertation has not been submitted by me for the award of any other degree.

Saumya Agrawal

Date: 28th May,2008
Place: Roorkee

Saumya Agrawal

This is to certify that the above statement made by the candidate Saumya Agrawal is correct to the best of my knowledge.

Ashutosh Joshi

Date: 28thMay,2008
Place: Roorkee

Dr. Ashutosh Joshi,
Assistant Professor,
Department of Architecture and Planning,
Indian Institute of Technology,Roorkee
Roorkee-247667(India)

CERTIFICATE

Certified that this report titled **Riverfront Development of Allahabad-'The Kumbh City'** which has been submitted by Saumya Agrawal, in partial fulfillment of the requirements for the award of the post graduate degree in Master of Urban and Rural Planning, in the Department of Architecture and Planning, Indian Institute of Technology Roorkee, Roorkee is the student's own work carried out by her under my supervision and guidance. The matter embodied in this dissertation has not been submitted for the award of any other degree.

Ashutosh Joshi

Date: 28th May,2008
Place: Roorkee

Dr. Ashutosh Joshi,
Assistant Professor,
Department of Architecture and Planning,
Indian Institute of Technology,Roorkee
Roorkee-247667,(India)

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Saumya Agrawal

Date: 28th May,2008
Place: Roorkee

Saumya Agrawal

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"A waterfront is a significant resource and a challenging opportunity for a city; a chance to be an escape for the pressure-cooker of crowded city life, a chance to be a bright breathing edge of city living."

—A.C. Moore

Chapter 1
INTRODUCTION

1.1 BACKGROUND

While a river flows, it supports many human activities & their habitation..All over the world river valleys have been cradles of civilization because all the major civilizations -Egypt on the Nile, Mesopotamia on the Tigris and Euphrates, Mohenjodaro and Harappa on the Indus flourished along the river banks.

Due to their importance to human civilization, rivers have been held sacred and worshipped in India since time immemorial. The riverfront development has played a key role in the life of the many cities. Like veins and arteries, rivers and canals are channels of connection and communication. The flow of rivers establishes a continuum, so that in communication they link ideas and expressions, and in connection they link space and time. Although their positions remain essentially the same, the rivers are kinetic elements - the flowing water constantly renews itself. The river flowing in the urban areas have been a major source of attraction in providing relief and refreshment for the people.

Yet many cities turned their back to rivers during industrial revolution and rivers were used as sewers and the riverbanks as slum and squatter settlements causing serious environmental degradation as well. As a result many rich flood plains and riparian systems have disappeared from many areas of the world and have now turned into degenerated entities in the backyards, calling for immediate attention and revival. This needs to look at the river system as a whole as a 'space', which could be possible through a rational approach for planned development of the area falling within the river area/zone.

The river cuts up cities in patches of development by providing the major movement corridor. This linear system of rivers threading through diverse districts can stitch this sprawling patchwork of districts i.e. can integrate developments. Considering the potentials of the river and proactive participation of people they can be made into the most attractive place.

Allahabad is one of such cities in India having a huge potential for its riverfront be utilized. The rivers Ganga and Yamuna pass through the city and converge at a point named 'Sangam' which is of great religious importance. The 'Kumbh'-religious congregation also takes place here and crores of people take a holy bath in the river Ganges. Inspite of such great importance of the

riverfront, it lies neglected and undeveloped. There is a need to integrate the riverfront into the life of the people of Allahabad.

1.2 NEED OF STUDY:

1. River facing side of Allahabad is still unused,holding huge potential for riverfront development.
2. More number of ghats need to be developed around Sangam and the existing ones strengthened,as number of pilgrims is increasing with each number of passing years.
3. Water circuit routes are missing in Allahabad.
4. Absence of recreational areas in the city for local and domestic tourist.
5. There is a need to develop and identify new mela grounds to share the thrust of Kumbha ground.

Plate 1.a) Wildlife at Sangam
Source: Website

Plate 1.b) Ghats at Sangam
Source:Author

1.3 AIM OF THE STUDY:

To develop the riverfront of an ancient city of India- 'Allahabad' and make large tracts of land parcel which are unutilized, more efficient.

1.4 OBJECTIVES OF THE STUDY:

1. To study the various efforts of the govt. in the western context regarding development of riverfronts vis-à-vis recreation, transportation & residential.

2. To study the present basic problems prevailing the waterfront of Allahabad pertaining to the present scenario taking into account Kumbh, security and recreational aspect.

3. To study the various approaches for the reclamation of land from the river bed and form a policy for reclamation & restoration of the flood plains.

4. Recommendations for planning proposal for integration of the river in the life of the people of Allahabad taking into consideration the socio-economic, religious & environmental needs,also the land-use & urban design aspects.

5. To prepare a landuse based policy plan for the riverfront of Allahabad with focus on detailing few areas of cultural & religious aspects.

1.5 SCOPE OF THE STUDY:

1. River front of Allahabad covers a large area, so restricting the detailed proposal to Kumbh area as it holds the highest priority in the development of Allahabad.

2. To study the development, growth potential and transformations of the river front.

3. The work would involve evolving of a landuse strategy, blueprint of a pilgrim township.

4. The task would involve the study to unearth the inherent potential of this educational,cultural and pilgrim centre.

1.6 LIMITATIONS OF THE STUDY:

1. Study the 200m. depth of the river on both sides.
2. Riverfront will be studied with major focus on the banks of Ganges abutting Daraganj, Jhusi & the edge along the Akbar's fort, Saraswati ghat & Sobatiyabagh.
3. Also take into account Arail side along the banks of Yamuna.
4. Detailed plans for specific cultural & recreational areas would be drawn & space allocations/plotting/landuse will be given as a part of the final study.

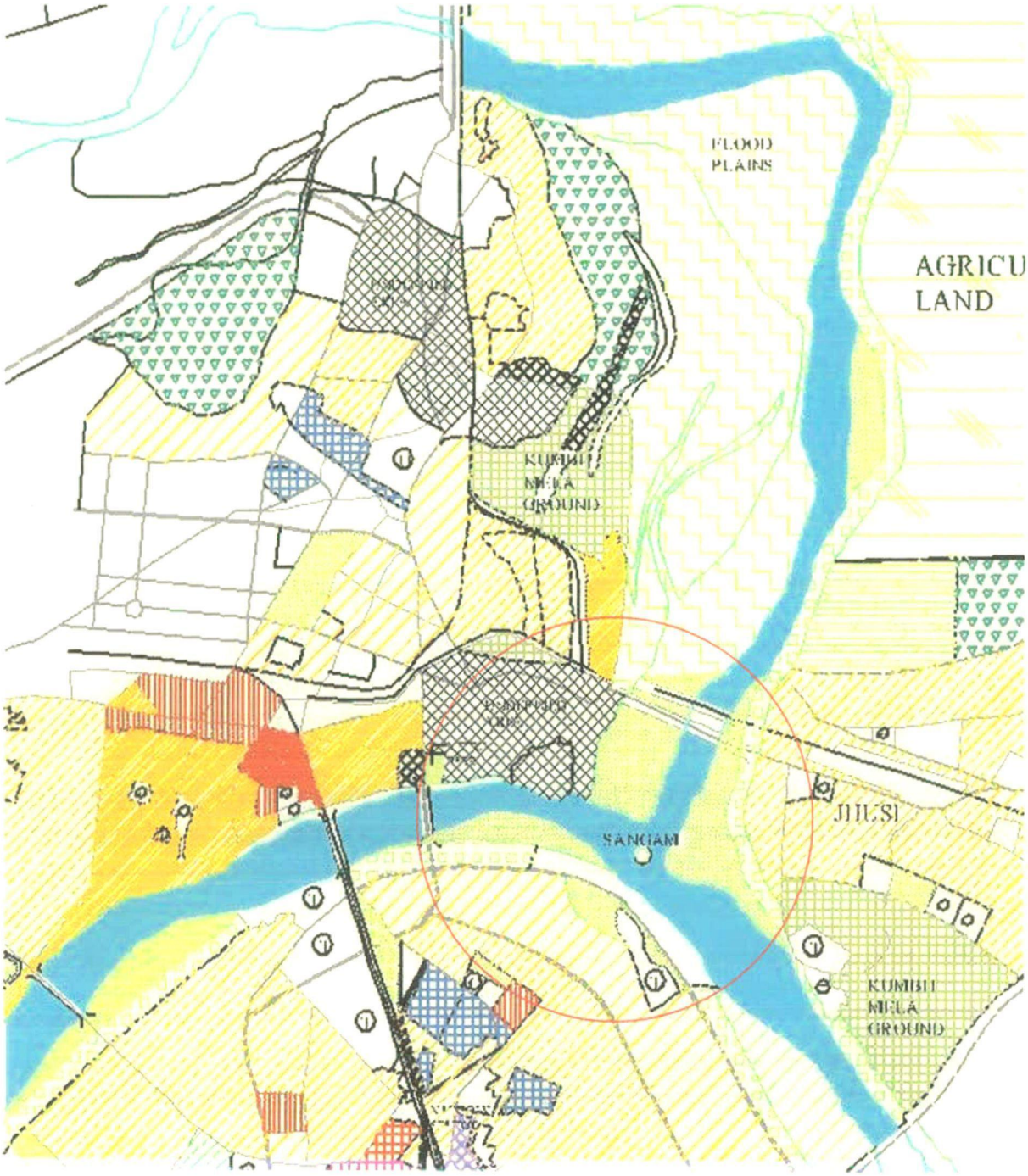
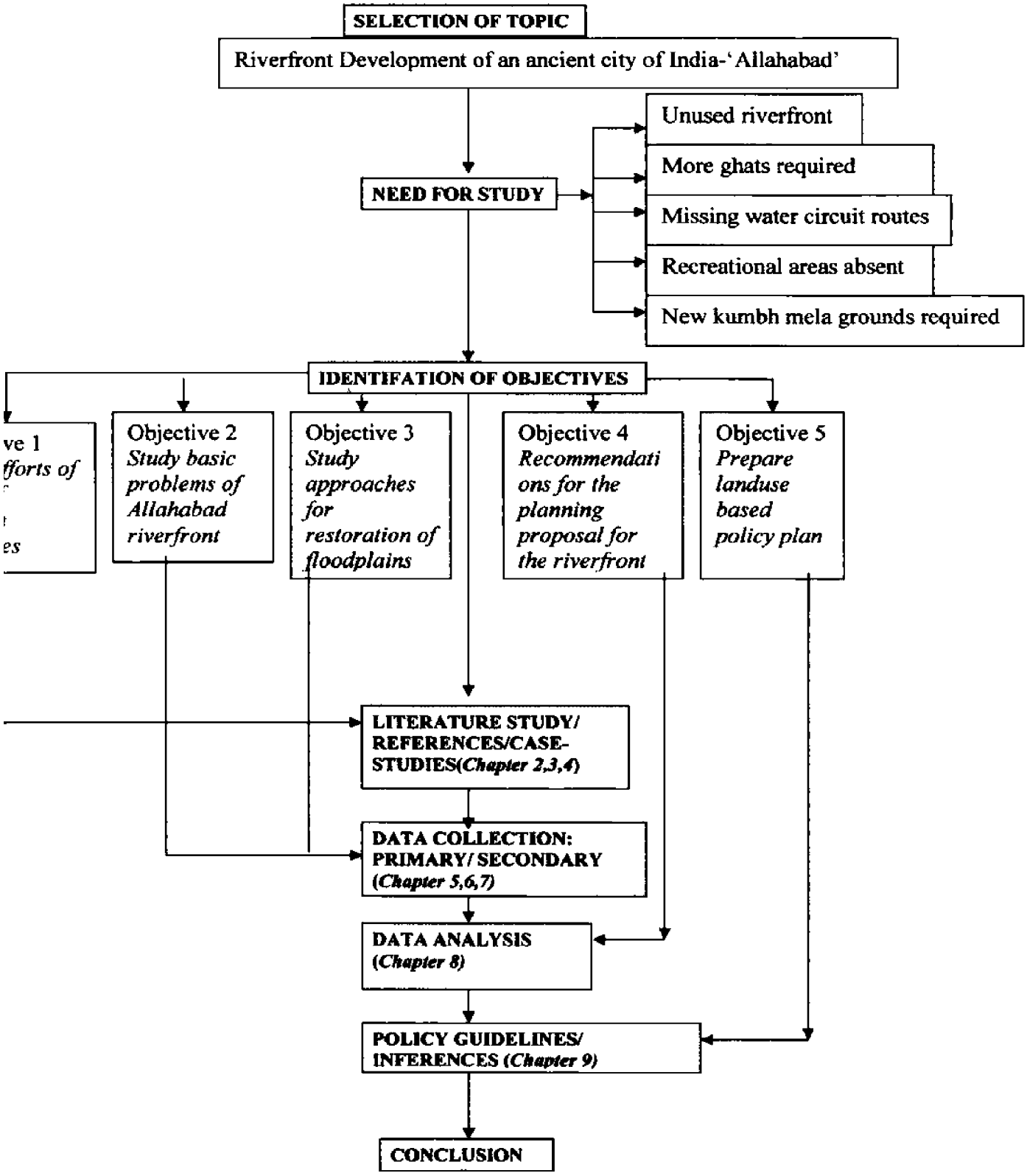


Fig 1.a): RIVERFRONT AREA UNDER SCOPE OF STUDY
Source:Master Plan 2021 of Allahabad

1.7 METHODOLOGY:



CHAPTER 2
LITERATURE REVIEW: GLOBAL CONTEXT

2.1 INTRODUCTION

This chapter discusses the role of rivers in the city from early historic period to the present, transformation in use of the waterfront from religious, educational,industrial,recreational and mixed-use making the urban waterfront an asset for the common man in the city. It further explores the urban values and the role of 'City Beautiful' movement on the waterfronts.

2.2 WATERFRONTS AS PART OF A CITY

Rivers have always played a major role in nourishing the civilization as evident in the history. The association of towns with the rivers brought enormous advantage through the ages.

Water has the quality of compelling one to participate with it. There is enormous emotional content in its natural form and gives immense pleasure. Large expanses of water redefine those parts of the city which abut them. It invites participation. Unique among urban surfaces, water defines its own scale, constantly changing its color and texture in response to wind and sky. The sound or look of water as in a pool or fountain can create a mood in the urban fabric. In its controlled designed urban fabric, water can induce different emotions by reference to its various natural states.

Urban waterfront attracts pedestrian activity; the edge of a water course offers a smooth channel for pedestrians to follow. Urban waterfront can provide an alternate focus often dominating surroundings. Water is the best edge a city can have. It creates simultaneously a barrier and a sense of infinite space. A waterfront in any city is most valuable natural asset. A city may exploit its natural waterfront to advantage. A water course inevitably, produces a waterfront along its path. The transformation of urban waterfronts plays major role in ongoing efforts to restore the centers of our cities.

2.3 WATERFRONT DEVELOPMENT: A HISTORICAL VIEWPOINT

The first conscious attempt to develop the urban waterfront in the city, where important activities and buildings were placed along the river was in the ancient city of Babylon. The city was divided by the river into two portions. The

streets were in straight lines parallel and at right angles to the river. At the end of the cross-streets, taken to the waterside, were low gates of brass in the fence that skirted the stream. The famous hanging gardens of Babylon, temples and Nebuchsdnezza's palace were located on the processional avenue leading to the magnificent Ishtar gate along river Euphrates.

2.3.1 Urban waterfronts in Greek cities

Agora, the center of activities in most of the Greek (Hellenistic) cities located along sea coasts or rivers such as in Miletus, Delos was invariably placed along the waterfront to take advantage of the harbor for trade and commerce and views of the water bodies.

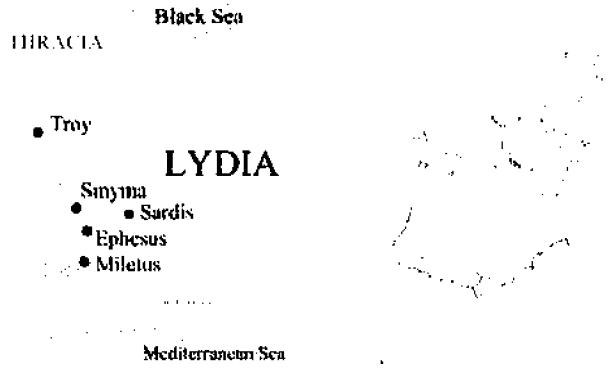


Plate 2.a) **Plate 2.b)**

Plan of Miletus
Source: Website

2.3.2 Urban waterfront in Roman Cities

Alexandria is the most remarkable maritime trading city,founded by Alexander on a coastal formation of the Nile delta which includes the island strip of Pharos and the inland lake of Maretis. The forum, royal area, and principal building temple, theater, gymnasium and library - were placed near the waterfront, on the principle later advocated by Vitrivius. This resulted in secured magnificent outlook for the communal area of the city, and gave it a practical relation to the shipping activities.A stadium was placed outside the wall, to the south west near the bend of the river. Cleopatra's needle was one of two Egyptians obelisks that gave distinction to the waterfront. The roman legendary architect Vitruvius suggested in De Architectura *"In case of towns placed by the sea or the banks of wide rivers ,the main or civic square and its public buildings be placed conveniently near the waterfront resulting in the best views".*

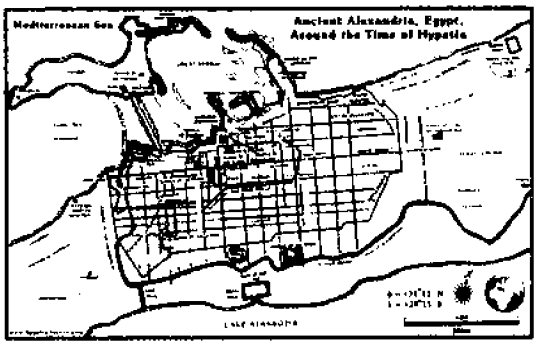


Plate 2.c) :Map of Alexandria
Source: Website

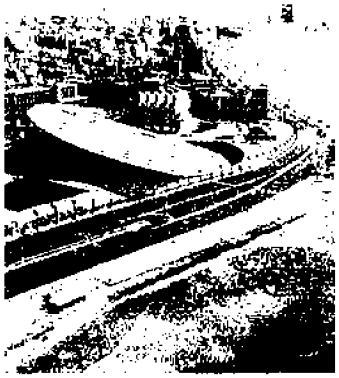


Plate 2.d)

2.3.3 Urban waterfront in medieval cities

2.3.3a) Florence

In Florence the medieval square Piazza della Signoria is purposefully connected to the River Arno as a force which sustains the city. The Uffizi Palace acts as a practical and an architecturally symbolic link between the town center and the River Arno. The palace is positioned on either side of the river street extension, leading to the river, dramatizing the river's existence.

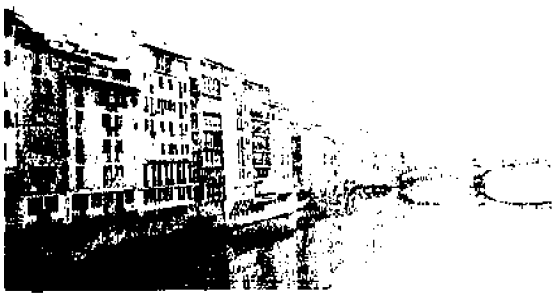


Plate 2.e) View of river Arno in Florence
Source: Website

2.3.3b) Venice

The city of Venice remarkable in origin, in the lines of development called by its aqueous citing, is an excellent example of waterfront development with a variety of uses along the water-body. Venice is unequalled among the great cities of the world, and is, indeed, the supreme European example of a communal organization combining convenience of location and pictorial magnificence. As Camillo Sitte said of it: *"No theater ever created a more sublime tableau than the spectacle to be enjoyed at Venice".*

Plate 2.f):Map of Venice

Plate 2.g):River as a means of transport
Source: Website

Plate 2.h):Fruit & Vegetables being sold from boats

2.3.3c) Amsterdam

The site of Amsterdam is in the southwest quarter of Zuider Zee, at a point where the small Amstel River enters the important tidal River Ye. By the 13th century the town developed along the two banks of the river. The advantage of the construction of the combined roads and canals was taken. The planning is clearly influenced by the extent and form of the waterways, natural and artificial, that played so large a part in the commercial activities and everyday living conditions of the Dutch towns. The encircling wall and wide moat gave clear definition to their size and shape. Care for garden space, tree-planting along the canals and elsewhere, added scenic attraction.

Plate 2.i): Map of Amsterdam showing network of canals

Plate 2.j):Amsterdam
Source: Website

2.3.3d) Paris

Paris in 1300 was a medieval walled city developed around the crossing of the River Seine which provided the central spine for design growth. From it extended perpendicularly a series of axial developments, notably the Esplanade and the Eiffel Tower.

Ever since the days of the Roman Empire, when Paris prospered through extensive river trading and expanded to the Left Bank, the Seine has been a great commercial artery, linked by canals to the Loire, Rhine, and Rhône rivers.

Officially established as the capital city by Clovis, king of the Franks, Paris evolved into a cultural center and a showcase of glorious architecture. France has a system of large,navigable rivers, such as the Loire, la Seine and le Rhône that criss cross the country and have long been essential for trade and travel .There are 14,932 km of waterways in France, of which 6,969 km are heavily travelled.The waters of the River Seine have always been the heart and soul of Paris. *Bateaux-mouches*, are unique long-boats leisurely plying the Seine, from which millions of tourists have acquired their considerable appreciation for all that Paris has to offer.

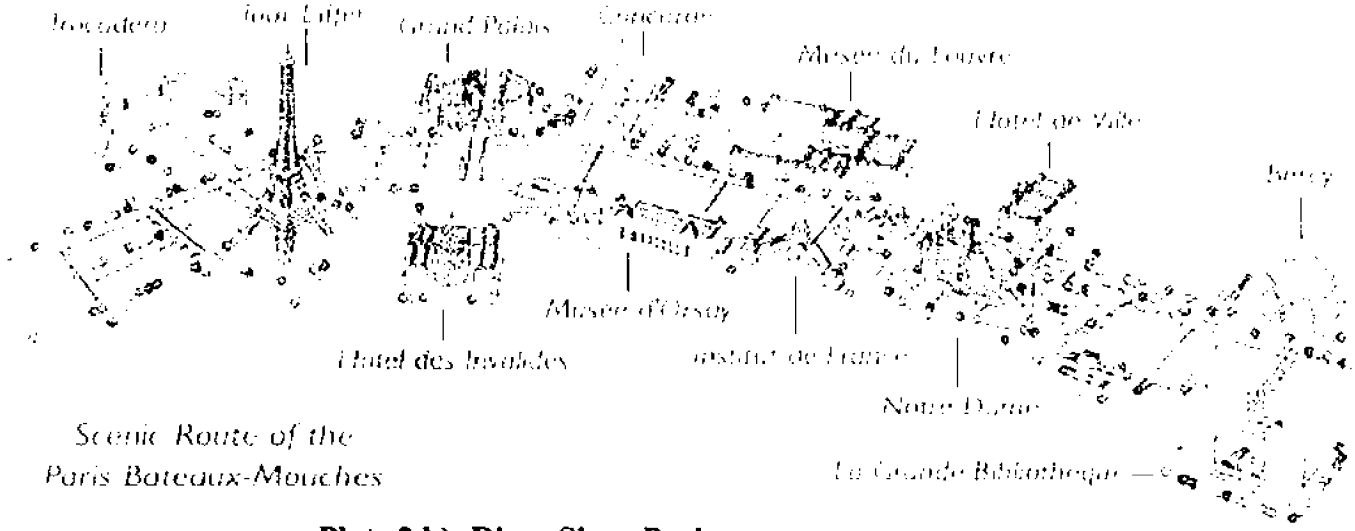


Plate 2.k): River Siene,Paris
Source: Website

2.3.4 Waterfront development in Indian cities

All villages, towns and cities in ancient India had their origin on the banks of the rivers. Early Aryan villages were located on the banks of the Ganges, Indus and their tributaries because the river provided important facilities like easiest means of communication with the other cities, thus helping to foster trade and commerce. ***Mohenjo-daro*** situated on the banks of Indus in Sind and ***Harappa*** by the side of the earlier course of the Ravi are the two most outstanding cities of the Indus Valley civilization.

In India, rivers are also deemed to be sacred. Bathing is regarded religious rite in itself. During Durga Puja and the Ganpati festival, images of the deity are immersed in rivers and the water bodies. Kumbh Mela, the pilgrimage occurs four times every twelve years, takes place at the following four locations of India, namely **Prayag, Haridwar , Ujjain and Nasik**. It is attended by

millions of people, making it the largest pilgrimage gathering around the world. The Ghats where everyone takes a dip in the river are the center of activities.

The European Influence on Indian cities

With the coming in of the European traders in the early 16th century, the river edge began to encounter new things. The river became the entry point for the Europeans from where their settlement grew. A new scale was introduced in the articulation of the land water interface with the coming in of spaces and structures for trade purposes. River being their 'front' became favorite location for ancillary services like hotels, churches, institutions and residences. Structures at waterfront were treated as objects in space and river was treated as an aesthetic backdrop to the recreational and ceremonial foreground with no intention to touch water. The British developed recreational activities around the lakes of hill towns like **Ooty, Dal, Kodaikanal, Nainital** etc. The mall road and flats along the lake Nainital, bike path along the Kodaikanal, are the main centers of tourist attractions.

The towns which developed on the banks of the river were generally oblong in shape to take the maximum advantage of the river.

The waterfront along many cities started being used for trade and commerce. Industries and warehouses were planned along the riverfront which acted as major transportation corridor as in the case of **Calcutta, Mumbai** and **Surat** .

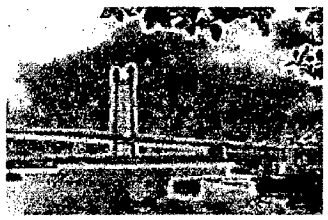


Plate 2.1): River Hoogly,Calcutta
Source: Website

2.3.5 The waterfronts after the industrial revolution

Major factories and warehouses were located along the rivers in the cities after the industrial revolution. The face of urban waterfronts began transformation in the mid 1800s as warehouses and shipping facilities joined the shoreline by rapidly growing rail systems. Added to the heavy industrial use of many waterfronts, the rail yards required extensive land and further expanded the industrial barrier around urban shorelines.

Following World War II waterfronts experienced significant negative changes as a result of the impact of use of trucks or roadways for the handling of goods, thereby diminishing the role of shipping. Dramatic increases in automobile traffic in downtown areas produced increasing demands for highway corridors to and through such areas. For many water-oriented cities, the result was a massive highway system constructed along the now largely rundown waterfront. While improving car and truck flow through the downtown area, the

multi-lane belts of concrete created sizeable physical barriers between city residents and their shorelines. As air transportation became more popular and sophisticated, larger and often new airports were needed in major cities. Many such cities lying beside waterways turned quickly to filling such areas or acquiring relatively cheap waterfront land to expand airport facilities.

A second significant post-war preemptive use of waterfront land resulted in cities where port facilities were being adapted to handle the new containerships. Enormous quantities of waterfront land were now fenced in for storing and redistributing containerized cargo.

A slight change in outlook concerning America's urban waterfronts began to evolve in the late 1950s and early 1960s. Both private enterprise interests and officials in local governments began to see the potential for something other than decay, seediness, wasteland and heavy industry on waterfronts. Local foresight and imagination were fanned into plans of action by newly available federal urban renewal funds.

2.3.6 ***Waterfront development and the City Beautiful Movement***

Development of urban waterfront acquired a new dimension in industrial cities with Colombian exposition. Proponents of the movement were deeply concerned with urban beautification. They had idealistic notions about civic well-being and the social benefits of public landscapes and parks. Four waterfront gems from this era standout:

a)The Chicago Lakefront
b)The Banks of the Charles River in Boston li
c)Detroit's Belle Isle
d)Philadelphia's Fairmount Park along Schuylkill River

Very few works of many leaders as Daniel Burnham, Frederick Law Olmsted, and John C. Olmsted survive in the form of shoreline parks, plazas, walkways, bridges, and riverside drives - beautiful public spaces.

2.4 FACTORS THAT LED TO REVITALISATION OF URBAN WATERFRONTS

a) **Environmental Cleanup plans** have been of great importance for the urban waterfront as it played a major role in transforming the polluted river water to a habitable use. In India the **Ganga Action Plan** was launched in 1986. The main objective of the program was to improve the water quality of river Ganga using a multi-pronged strategy and to be financed with Central assistance. The Action Plan envisaged interception and diversion of waste water reaching the Ganga and installation of

Sewage Treatment Plants for its treatment. It also included other pollution control activities such as solid waste management, installation of crematoria, river front development and provisions of low cost sanitation facilities.

b) The economic factors play a major role in development of a waterfront project. Joggers, bikers and walkers took to the outdoors as interest in healthy pursuits became widespread, creating a demand for more trials, pathways, and open spaces.

c) Expansion of tourism has been another background factor in the rejuvenation of waterfronts. The development authorities in different states proposed their urban waterfronts for recreational activities and promote tourism as a generator of income for the city. The dispersed pockets of recreational and tourism spots inside the city are linked with the waterfronts to attract people.

d) The market place in Lake cites were a new form of development along the water where something new and positive happens on waterfronts. These developments along the shoreline define the space and protect the bank.

2.5 CONCEPT OF RIVER BED DEVELOPMENT

The optimum and sustainable use of land, water and natural resources has been the endeavour of the planners all over the world including India. In recent times the Integrated River Bed Planning and Management has been considered as a strategy to achieve the objective of optimum and sustainable utilization of water resources. It involves reclamation of land from the river bed and then developing the reclaimed land.

River Bed planning and management not only enables us to improve the management of our river basins but this concept also integrates all the interests of organizations and people that use and influence water. Successful River Bed planning and management requires not only the involvement of different interest groups but also the integration of various disciplines like social and natural sciences, economics, law and planning.

2.6 INFERENCES

It is evident that the people of cities like Greek, Roman, Venice, Paris and the Indian cities including the Aryan villages, Calcutta and Surat tapped the potential of the river and made their lives river centric and used the river as a resource for city development. Later, after the industrial revolution, the rivers were turned into backyards and became highly polluted. In the later part of the

twentieth century, again the thrust was given on the revival of the waterfronts to bring them to the forefront and make them part of the city life.

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Chapter 3
CASE STUDIES: WESTERN CONTEXT

3.1 INTRODUCTION

This chapter deals with the various riverfronts from western countries. It includes the Thames riverfront, London; The Sydney riverfront, and the Pittsburgh riverfront development. It will give an overview of the success of these developments. The developments range from recreational to commercial, residential and industrial. The various problems faced by the riverfronts initially and how they were solved has been discussed.

3.2 THE THAMES RIVERFRONT, LONDON

REASONS FOR SELECTION:

1. It has been developed for all kinds of activities including recreational(riverside gardens, pedestrian walkways, golf clubs, waterfront leisure centres),transportation(deep water jetties),residential(Baston's and Regent's Wharves),and commercial developments.
2. The river has been made alive by improved sewage disposal into the river. Various sewage treatment plants have been installed.
3. Conservation of wildlife has been given priority.

STRENGTH OF THE CASE STUDY:

1. After centuries of pollution, the river is now a living river.
2. The various docklands have been revitalised for residential and official projects.
3. Wildlife has been conserved and various natural reserves have been setup.
4. The river is the focus of London's commercial,administrative ,ceremonial and transport activity.
5. The flooding in the river has been controlled by The Thames Barrier.

SUCCESS OF THE SCHEME:

The scheme has been a great success. The river is now regarded as one of the cleanest Metropolitan estuaries in the world.

3.2.1 INTRODUCTION

The Thames is 346 kilometers in length and is the longest and most important waterway in England. It flows through the heart of London and has played a key role in the history and development of the capital city and continues to be a major asset for London, having a distinctive natural and built environment.

The character of central London set along the River is an important part of London's identity as a capital and the water route. The River's many cherished views and vistas can be enjoyed along the River. It forms the largest open area in the City and its open character and atmosphere is an important foil to the dense urban fabric, which characterizes much of the City. The River and foreshore form an important wildlife corridor and are an important archaeological area containing evidence of London's origins and historical development.

The River Thames has been the focus of much of London's commercial, administrative, ceremonial and transport activity.

3.2.2 THE HISTORICAL DEVELOPMENTS ALONG THE RIVER:

The Thames Path presents old stories alongside new changes, demonstrating that the dynamics of this hard-working river are still on the move. The River has undergone major *historical changes*.

Plate 3.2.a): Map of London city
Source:Website

The character of East London's working river has been built up within centuries. Henry VIII established his royal dockyard at Woolwich to build our first naval warships. The famous Royal Arsenal grew up on the site, manufacturing the guns and ammunition that fuelled Britain's military might

while across the river, giant docks were constructed to handle exotic cargoes from all around the world. The Victorians' passion for pleasure steamers put Erith on the map as a river resort and in the 1930s, Henry Ford gave business a boost when he set up his factory on Dagenham's 500 acre site.

Roman Londinium was built on gravel terraces to the north in AD 50 and had extensive port facilities (along the line of present-day Thames Street). At low tide the river was almost 3 times as wide as it is now with expanses of reedbeds and marsh, especially to the south.

As London grew land was reclaimed, including Thorney Island on which Westminster Abbey stands. As river transport increased, wharves and warehouses were built for loading and unloading and by the mid 20th century thousands of acres had been reclaimed as sites for housing, factories, docks and power stations.

Plate 3.2.b): The Thames
Source:Website

Plate 3.2.c):The Ferris wheel
Source:Website

There were occasions when the Thames froze over and *Frost fairs* were held.The ice was used for all manner of things:'streets' of booths were set up, printing presses would sell souvenir broadsheets, oxen would be roasted and activities such as dancing and archery took place. A good time was had by all - except the Watermen, who lost their trade.

For some 400 years the ceremony which marked the appointment of the *Lord mayor of London* took place on the Thames. A much newer celebration of the Thames is the *Thames festival* involving hundreds of different organisations. The event, which takes place mid-September, centres on the South Bank with numerous attractions and activities. It culminates with a Lantern Procession and fireworks display on Sunday evening.

The great *River Race* is rowed on a handicap basis over a 22 mile course.Around 300 traditional style boats take part including wherries, canoes and Dragon Boats. The race takes place in September.

Plate 3.2.d): The Thames river embankment
Source:Website

The Thames is crossed by a number of BRIDGES

Plate 3.2.e):Tower Bridge
Source:Website

Plate 3.2.f):Boating facility
Source:Website

3.2.3. POLICIES FOR DEVELOPMENTS IN THE RIVER THAMES AREA OF SPECIAL CHARACTER

Set out below are more detailed criteria for commercial development on, or in the vicinity of, the River Thames frontage. These form part of Policy ENV25.

a) Proposals should, where possible, take advantage of the riverside location and provide facilities for the movement of freight and passengers, as well as facilities for tourism.This may include the provision of jetties/wharves.
b) Any developments on the river frontage should not prejudice navigation of the river.
c) New developments should be designed to a high architectural standard and in particular the height and scale of the development should reflect and enhance the character of its riverside setting.
d) Where possible, developments on the river frontage should "look out" over the river and open storage/car parking areas should either be avoided on the river frontage or be well screened by good landscaping.
e) Developments should be sited so as to allow views to and from the river and the opposite bank.
f) Any developments proposed on the river frontage should have regard to the Council's policy (LAR9) with regard to the footpath along the river front.

g) The Council will safeguard the existing access points to the footpath along the Thames. In addition, the Council may when applications are made on riverside sites, seek to negotiate the opening up of further access points along some parts of the river.
h) Landscaping of new developments should take into account the riverside setting and the views thereof. The design of such landscaping and the choice of species etc, should reflect and enhance the value of the river and its shoreline for wildlife.

Plate 3.2.g):The developments along the Thames
Source:Website

3.2.4 THE VARIOUS DEVELOPMENTS ALONG THE THAMES PATH

a. Thames barrier to the Royal Arsenal

Plate 3.2.h):The Thames barrier
Source:Website

Thames Barrier :

The ship-shaped peaks of the barrier make an awesome introduction to this section of the Thames Path.This mighty feat of modern engineering protects 1.25 million Londoners, 26 tube stations and over 4,000 properties from the increasing risk of flooding due to rising water levels and 'surge tides'. Conceived after 300 people died when the Thames flooded in 1953, it finally opened in 1982. The Barrier will serve until at least 2030 – by which time, possibly, it may close some 30 times a year.
Woolwich Dockyard :It is now a housing estate.
Woolwich Free Ferry :The ferry links with North Woolwich and the vast Royal Albert Dock and King George V Dock - now the site of London City Airport.This free service for vehicles and foot passengers dates from 1889. Then there's the *Waterfront Leisure Centre* .
Woolwich Foot Tunnel: The 'rotunda' building was built in 1912 as an alternative to the Free Ferry, the tunnel was used by thousands of workers who had previously lost wages whenever the ferry was delayed by fog. Then along the riverside route are the new *Royal Arsenal Gardens* beautifully landscaped.

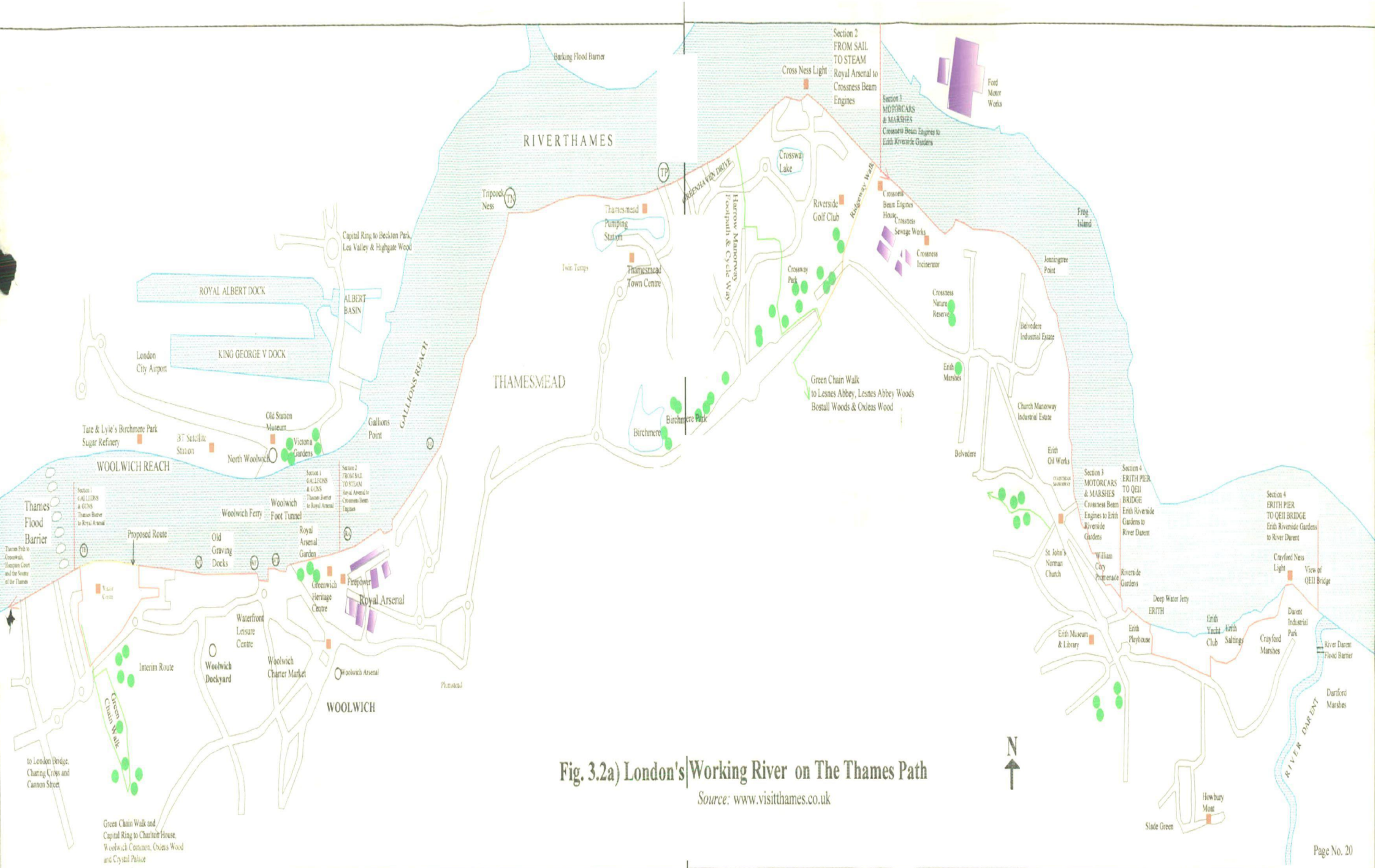


Fig. 3.2a) London's Working River on The Thames Path

Source: www.visitthames.co.uk

Nearing the historic *Royal Arsenal* are the superb views of the *Dome* and *Canary Wharf.*

b. Royal Arsenal to Crossness Beam Engines station

There's the Firepower and the *Greenwich Heritage Centre.* Then along the Thames path is the *Broadwater Lock* . Here the river broadens out into Gallions' Reach. Beyond here the unfenced gravel path has an open, rustic feel. At the far bank is the Gallions Entrance to the *King George V Dock* .From here distant views of the Post Office Tower and *Canary Wharf* can be obtained. Ragged timbers and the cry of gulls gives the river a more jaunty, seaside air. This is the site of the proposed *Thames Gateway Bridge* that is awaiting a public enquiry.Then is the *Tripcock Ness* , so named in sailing days as the vessels heading inland were forbidden to carry anchors "cock billed", or cable hung, beyond this point. Across the river, two 60m towers operate the drop-gate flood barrier that guards the mouth of Barking Creek.Then comes the blank bulk of the *Thamesmead Pumping Station* and then the *Harrow Manor Way.* Then there's the Cross Ness: its light is visible to shipping for eight miles.
The Riverside Golf Club comes after the ness and just beyond that is the *Crossness Beam Engines* .

A masterpiece of engineering and a cathedral of ironwork, the Crossness Pumping Station is in the corner of Thames Water's sewage plant. It is an industrial icon. Four magnificent steam-driven beam engines, housed here were used to pump London's sewage into a neighbouring reservoir and from there it was discharged into the Thames on ebb tides. Opened in 1865, the Pumping Station was a key element in Joseph Bazalgette's vast new sewage system for Victorian London, which is still in operation today.

c. Crossness Beam engines to Erith riverside

Next is the *Crossness Incinerator,* the futuristic building with the curved chimney. The plant incinerates sewage generating power to drive the sewage works and producing soil fertilizer as a by-product. Beyond the reedy fringes of the river, there's more hi-tech activity at *Ford's Dagenham Plant* on the opposite bank. Car production ended here in 2002 but the new Dagenham Diesel Centre produces a million diesel engines a year using clean electricity generated by its own 85-metre wind turbines. Next is the *Crossness Nature Reserve* which is a real birder's paradise.

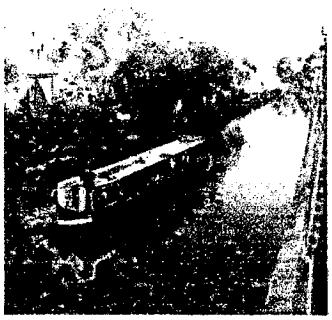
Plate 3.2.i):This "urban wilderness" on the Erith flood plain is one of the last surviving open areas of grazing marsh in Greater London
Source:Website

In recent years, over 130 species of birds have been recorded on the 20 hectare site. Viewing facilities include a bird hide, sand martin wall, bat cave, artificial nesting cliff and the boardwalk around a reedbed frequented by water rail, sedge warblers, willow warblers and reed buntings.

Then along the path past industrial units is the *Crabtree Manorway* . On the opposite bank, at *Frog Island*, the wooden waste disposal building is taking shape.Then comes the *Rainham Marshes* .Here the whole landscape is green,it is a former shooting range.The Rainham reserve lures ducks and waders to this part of the river in winter months. Then towards *Erith*, is a network of cranes, chutes and the sort of working wharves that served all shipping before the advent of enclosed docks. Then the Path opens out to views of Erith's curving waterfront, with modern housing, old church towers and dramatic vistas of the QE II Bridge. Then comes the *Corinthian Manorway* , heading past new housing and down William Cory Promenade to come to *Erith's Riverside Gardens* .

d. <u>Erith riverside gardens to Crayford ness/river Darent</u>

Ozone and estuary views at *Erith Deep Water Jetty* are enjoyable.



i)

Then comes the *Erith Yacht Club.*
Warships, galleons, liners: this stretch of the Thames is familiar with craft of every kind. Erith was a favourite port with Victorian pleasure steamers. Container ships, car ferries, waste disposal barges, police and pilot launches make up most of the traffic today. Distinctive red-ochre sails of traditional Thames Sailing Barges can be seen. Now there are a handful of them as pleasure craft and may be spotted heading upstream to moorings at St Katharine Dock, near Tower Bridge.

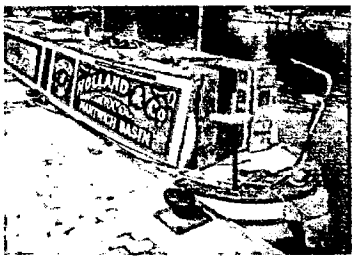


Plate 3.2.j):Still a busy waterway
Source:Website

ii)

Then comes the *Crayford and Dartford Marshes*. The landscape here has a wild, estuarine feel. To the left lie *Erith Saltings* - the last remaining fragment of salt marshes on London's inner Thames. At low tide, remnants of a ghostly forest are sometimes visible on the foreshore here. The Thames Path finishes with a flourish at *Crayford Ness* by the River Darent Flood Barrier, built to protect Crayford and Darenth from flooding at high tides. From here, the Cray River Way and London Loop head southward along the bank of the River linking with a signed route back to the station and buses at Slade Green.

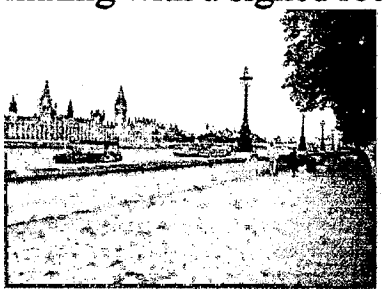


Plate 3.2.k): Thames river pedestrian walkway
Source:Website

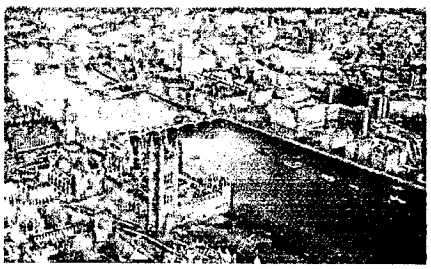


Plate 3.2.l):The Thames
Source:Website

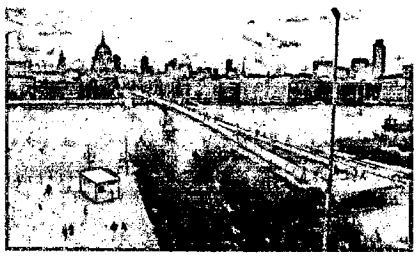


Plate 3.2.m):The millenium bridge with St. Paul Cathedral in the distance
Source:Website

3.2.5 THE RIVER'S WILDLIFE:

The Thames once had important and valuable fisheries. By the early 19th century much of the river's wildlife had been destroyed by pollution and habitat loss. In 1960 the GLC and Thames Water Authority embarked on a 20 year project to clean up the river, which is now regarded as ***one of the cleanest Metropolitan estuaries in the world*** due to improved sewage disposal and tight control of other discharges.The Thames is a wildlife corridor and provides a

wide range of habitats. It supports ***118 species of fish*** which stock the North Sea.If buildings encroach, the increased flow will accelerate erosion and the narrowing of the river would increase flood levels and tidal range. The 'Thames Bubbler' has been used since 1989 to re-oxygenate polluted water and was joined in 1997 by the 'Thames Vitality'. The 'Thames Guardian' monitors water quality for the Environment Agency.

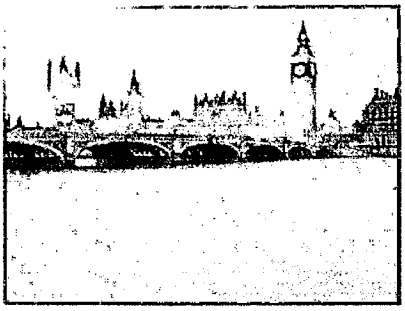


Plate 3.2.n):The Big Ben and the Thames
Source:Website

The Thames can be divided into 3 zones: freshwater (down to London Bridge) saltwater (beyond Southend) and brackish (in between) but varies according to rainfall. These areas dictate the types of fish found with fewest species in the brackish zone.

The Thames is a good food source for birds. The Mallard is the most familiar of the ducks with a green-headed male and a brown mottled female, both with purple wing patches. Some other birds found are cormorants, black headed gull, herring gull, Canada geese, feral pigeon, coot and the crow.

3.2.6 THE POLLUTION IN THE RIVER:

Cesspits were abolished in 1847 and the waste of London's large (some 3 million) population was all going into the Thames. There were numerous cholera epidemics (10000 Londoners died in 1853) .1858 became known as the 'Great Stink' when sheets soaked with chloride of lime were hung in the Palace of Westminster to try and combat the smell. The sewage system, that is still in use today, was built by the Metropolitan Board of Works to the designs of Joseph Bazalgette between 1865 and 1874. It was a 1,300 mile network of brick built sewers at 3 levels on both sides. The high and middle levels worked by gravity but the low level was aided by pumps. The elaborate buildings constructed still exist at Abbey Mills and Crossness. The project included the constuction of the Victoria, Albert and Chelsea Embankments stretching 3½ miles and reclaiming 32 acres of land.

3.2.7 HOUSING DEVELOPMENT AT LONDON DOCKLANDS

After long years of muddle, argument and indecision on the part of various authorities and politicians, London Docklands is being gradually redeveloped. Yet only a few architects and developers have had the courage to respond to the scale and traditions of the Thames.

As the big commercial developers have realized, riverside dwellings are bound to be popular because living by water exerts a powerful and universal appeal.**CZWG** have now designed a number of housing schemes in Docklands. To the two schemes built in the '80s - ***China Wharf near Tower Bridge, and Cascades east of Canary Wharf***(1) - they have added **Dundee**, at Limehouse, west of Canary Wharf, and another under construction at **Batson's** and **Regent's Wharves** south of Cascades. It is the biggest so far, providing 240 flats of various sizes. Piers Gough and Rex Wilkinson are well known for their flamboyance.Here in Docklands, with space, air and water around them, they appear to have come into their own. These architects and their brave developers have responded to the scale and drama of the river, and without their contributions to the riverscape, the trip would be dispiriting indeed.

From the outrageous scarlet-wreathed pagoda at China Wharf onwards the buildings are big, bold and exuberant, their forms echoing the heroic scale and mass of traditional warehouses and grain silos. Other resonances of an industrial past are present in the architects' treatment of surfaces, creating texture and grain through the abstract patterns of windows, projecting balconies, bristling metalwork and other protuberances reminiscent of dockside landscapes.

All the schemes so far have been for private housing and the flats have been sold almost before being put on the market. Most sites have one aspect better than another; but because of the romance of water, riverside sites are apt to have front- and back-sides. *The usual plan is to put more expensive dwellings along the waterfront, pushing the rest to the rear.*

CZWG's efforts to break down the hierarchy while at the same time providing a riverside landmark is apparent in shape of plans and clustering of buildings. **Dundee**, for example, provides 160 flats and is on the outer bend of the river. The drama of the site is expressed by the building, an irregular horseshoe that embraces an inner court, rising at the apex to form an 11-storey cover. In front of it ,straddling the riverside wharf is a steel structure; inspired by a travelling dockside crane, it is made up of balcony decks linked by bridges to the tower apartments and held within a vertical frame of V-shaped members. The tower is

flanked by two wings facing up and down stream and decreasing in height from seven to three storeys as they reach inland, along Lime Kiln Dock on the west and the site boundary on the east. Flats look onto water on one side, the inner court on the other. The V-shape is a recurring theme, appearing in the base of the steel tower, and in the vertical struts that support balconies and animate the surface of the building. Such an abstract evocation of the dockside landscape - the network of steel projecting from the solid mass of the building - has been achieved successfully.

Batson's and Regent's Wharves : The plan responds to the need to give each flat a river view, and to the existing urban grain. The scheme stepped back from the waterfront has been split into seven separate units arranged in two rows. Waterfront buildings have been folded back into butterfly wings, the fold creating apertures in the row and giving the radially curving units at the back a view of the river. Echoes of proscenium arches and emphatic perspectives suggest the maritime theme.

Canary wharf – London Dockyards

This mixed use development project revitalized 71 acres at the site of the West India Maritime Shipping Facilities docks. Over 10,000,000 square feet of office space designed specifically for the expansion of the financial services sector were set within a strongly articulated public realm. A sequence of public spaces were developed that were integral with the project architecture and infrastructure. Urban squares, courtyards, boulevards, and esplanades are located over occupied space, which required the development of innovative construction and planting technologies for the creation of "established" landscapes with semi-mature plant materials. Growth support systems were designed to promote longevity of the trees in a stressful environment caused by limited root space, restricted water and drainage, high winds, and prolonged shade created by adjacent buildings.

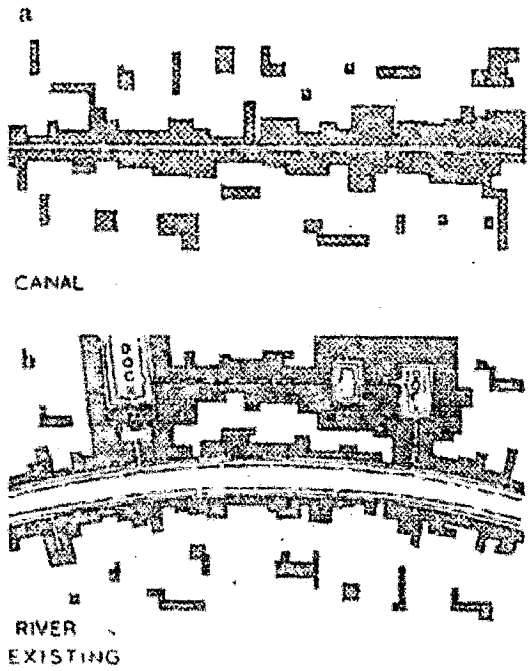
Proposal by J.H. Forshaw and Patrick Abercrombie in the County of London plan

Source: Town Design By Frederick Gibbard

Waterside industries usually present an aesthetic problem similar to ribbon development along main highways, as the factories and storage warehouses generally extend in a thin straggle along the waterfront, shutting it out from view. An interesting solution was proposed by **Forshaw** and **Abercrombie** in the County of London Plan.They accepted that the heavy industries situated on the waterways were all well established, and no fundamental alteration to the

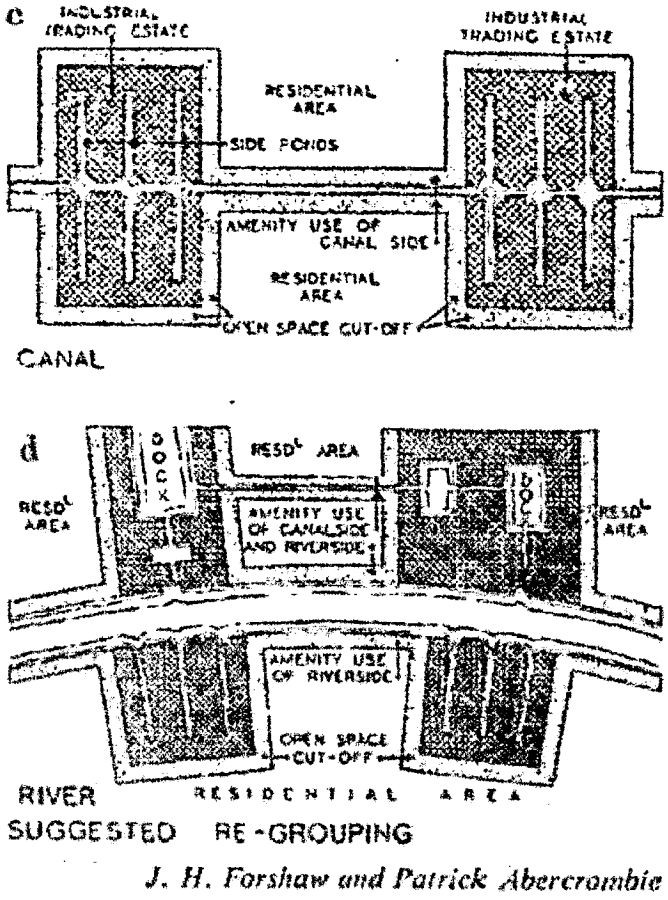
location of the existing concentrations was desirable. But they showed how inefficient and uneconomical they were in relationship to the use of the water frontage, and ***proposed a development in depth by the provision of new side ponds or basins, around which the industries could re-group into clearly defined areas. The spaces between the groups would ultimately revert to residential use, and the waterfront opposite them be opened up and planted for visual pleasure.***

Diagrams (a) and (b) from their report show typical existing canal-side and riverside development with continuous wharves, warehouses, and industrial buildings of uneconomic depth spreading into adjacent residential areas.



The river or canal wharf frontage so lost is compensated for by the provision of side ponds.With the decline of canal transport, and improvements in both rail and road facilities,many factories no longer use wharfage. It is thus possible (when the buildings become unfit to work properly) to re-site them on factory estates elsewhere in the town, without giving rise to the economic problem of creating new wharfage.

Plate 3.2.o):The Wharves
Source: Town Design By Frederick Gibbard



J. H. Forshaw and Patrick Abercrombie

Plate 3.2.p):The Wharves
Source: Town Design By Frederick Gibbard

Diagrams (c) and (d) show the suggested regrouping of the industrial buildings into trading estates with the areas in between them providing waterside amenity for the adjacent residential areas

3.3 SYDNEY WATERFRONT

REASONS FOR SELECTION:

1. The Central Quay planning is human in scale and character without sacrificing modern transportation planning. It is the interchange point for city rail, ferry, monorail and bus.
2. It is multi-dimensional in character-transport hub for city siders,a place to visit for tourists,centre of public celebrations and a natural amphitheatre.
3. The promenade is lined with open air eateries and boutique shops – a wonderful lively place bustling with activities all the time.

STRENGTH OF THE CASE STUDY:

1. The vast promenade is one of the liveliest urban public places.
2. The design theme of the waterfront is simplicity and avoidance of clutter.
3. Only such activities are permitted which have relevance with the special character of the place.

SUCCESS OF THE SCHEME:

The project was a great success and received from the RAIA the Lloyd Rees Award for Urban Design and the national Civic Design Award,along with a national Merit Award for the Overseas Passenger Terminal

3.3.1 INTRODUCTION:

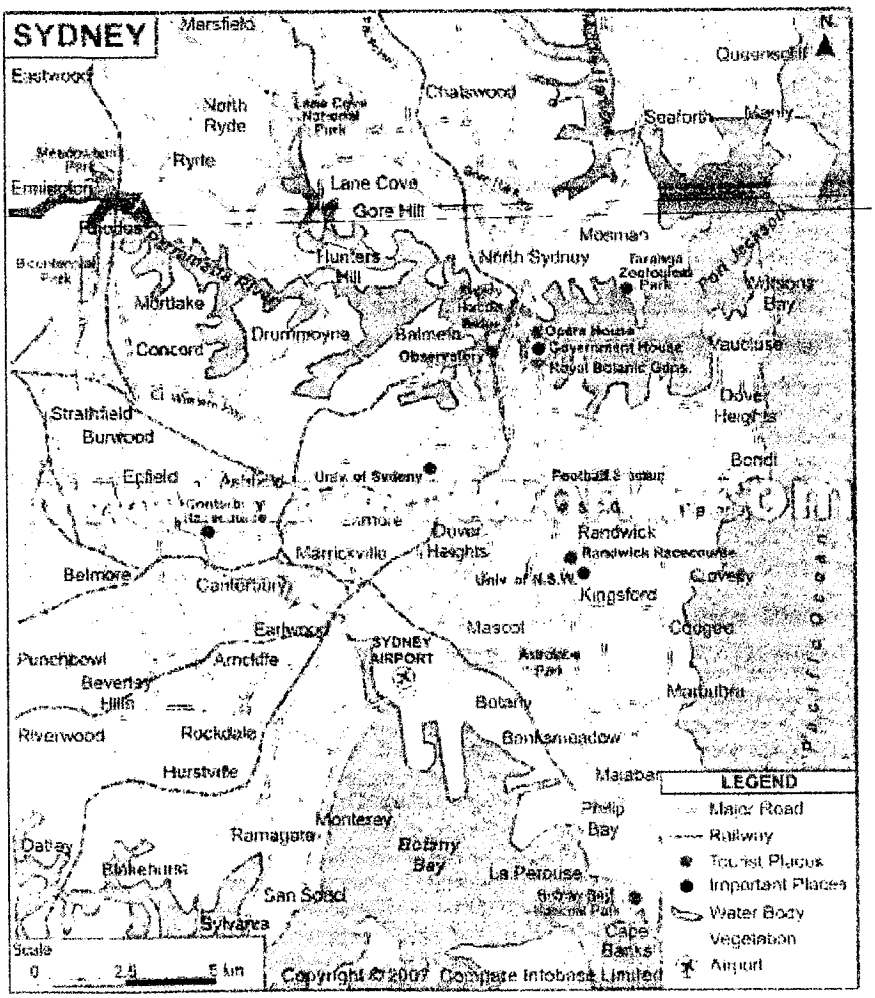


Fig.3.3.a): Map of Sydney
Source: Website

Walking along the Sydney waterfront is like attending the Urban Design colloquium of Prof Foster Armstrong.

Flanked by the iconic Sydney Opera House at one end and the elegant Harbour Bridge on the other, the gleaming skyscrapers at the backdrop, the vast promenade is one of the liveliest urban public places.

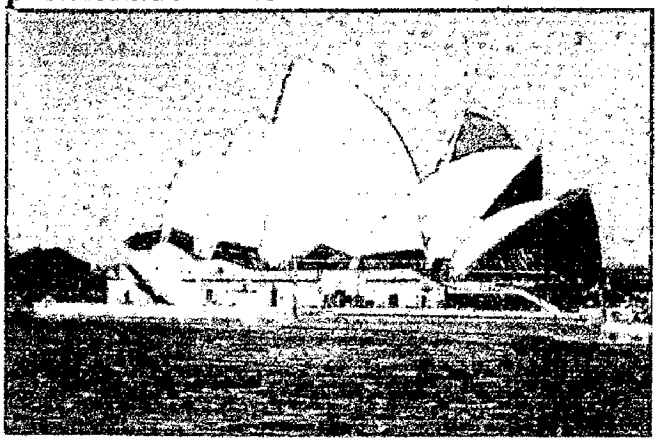


Plate 3.3.a):Sydney Opera House-viewed from the ferry
Source:A+D,Oct.2006 issue

Use of water as an element of Urban Design is culture specific. Australians give their preference for aquatic sports or building their cities along the edges of water. Those leaving inland, drive with boat trailers to the nearest lake or river to enjoy a weekend outdoor in benign climate. Sydney Harbour - officially called Port Jackson, is the world's largest natural harbour and the city itself has grown along the edges of water.

3.3.2 THE CHARACTER OF CENTRAL QUAY:

Like most public places, Central Quay or Sydney Cove is **multidimensional** in character. *"Sydney Cove marks the invasion point, and the point from which the decimation of the Aboriginal people began"*, says Urban Sociologist, Andrew Nimmo. For Sydney siders,it is one of the city's major transport hubs,where thousands of people converge as part of their daily routine. For visitors it is, alongwith the Rocks and the Opera House,one of the places that must be visited. It is perhaps Sydney's only truly great public space- that is 'great' in terms of international significance. It may not be a place for mass rallies or demonstrations, but it is the centre of Sydney's great public celebrations and forms a natural amphitheatre within which to view Sydney's three chief icons, the Opera House, the Bridge and the Harbour.

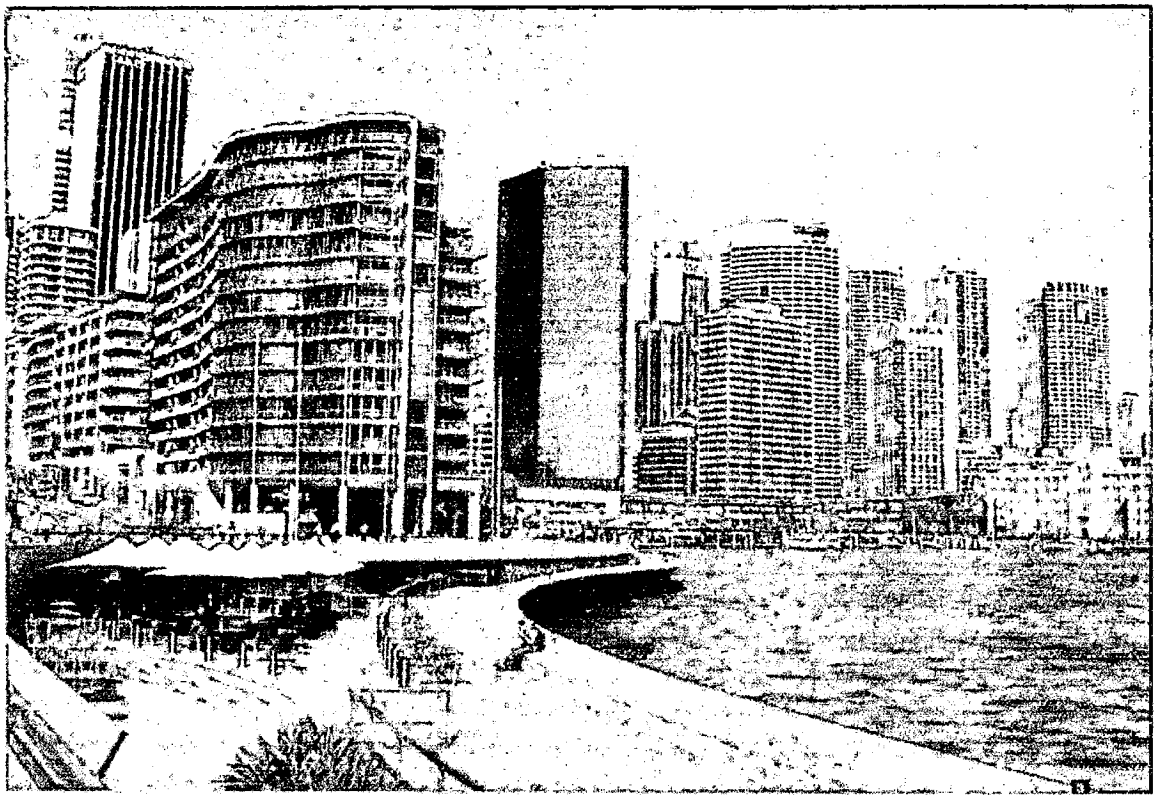


Plate 3.3.b):Waterfront promenade- in front the gleaming skyline
Source:A+D,Oct.2006 issue

The Central Quay area developed in stages spanning over two hundred years of Australian history. The present form of a major urban recreational space is due to the renovation done in 1988 as part of the Australian Bicentennial celebrations. A number of prominent architects were engaged under the overarching umbrella of the NSW Government Architecture Department to refurbish the Overseas Passenger Terminal,the Ferry Wharves, the pedestrian journey out to the Opera House and to complete an all-encompassing urban overlay of paving, signage, lighting and the like. The project was a great success and received from the RAIA the Lloyd Rees Award for Urban Design and the national Civic Design Award, along with a national Merit Award for the Overseas Passenger Terminal. Jon Utzorn designed Sydney Opera House, which was built in 1973, and is one of the greatest works of modern architecture. The last major refurbishment was done in 2000, during The Olympic Games.

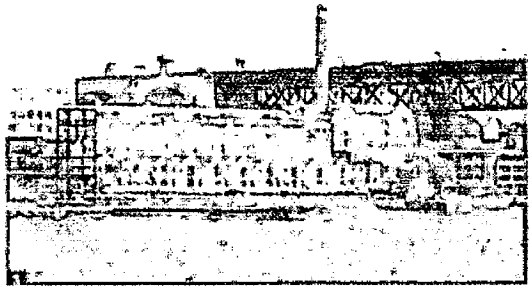


Plate 3.3.c):Power House Museum(an old powerplant now converted to a museum)at the waterfront
Source:A+D,Oct.2006 issue

3.3.2a. Central Quay as Transport Hub

Functionally, Central Quay is a transportation convergence and interchange point for city rail, ferry, monorail and bus.

Plate 3.3.d):Ferryboat
Source:A+D,Oct.2006 issue

But unlike most places, where mode transport and its functional priorities override everything else, the Central Quay planning places the people first. It is human in scale and character, without sacrificing the convenience of modern transportation planning. Cahill Expressway an elevated highway and the Central Quay Station are connected to the promenade level by glass elevators, while the station platform itself acts as a sheltered viewing area.

The design theme of the waterfront is simplicity and avoidance of clutter. Only such activities are permitted which have relevance with the special character of the place.

3.3.2.b. Central Quay as Recreational Space

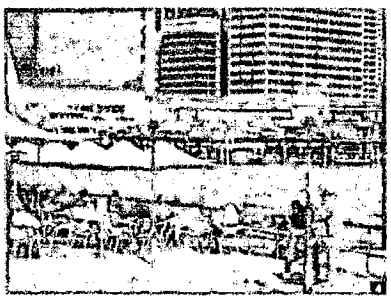


Plate 3.3.e):Open air restaurants at the waterfront
Source:A+D.Oct.2006 issue

The promenade itself is lined with open air eateries and boutique shops – a wonderful lively place bustling with activities all the time. Simple street furniture and innovative paving pattern lend elegance and design unity. The paving includes occasional brass inscriptions about famous writers associated

with Sydney. It is also called Writer's Walk- a completely barrier free space, where one can ride a wheel chair all the way without any hindrance.

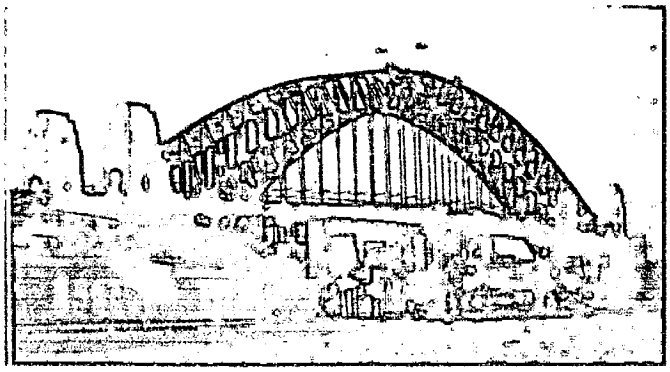


Plate 3.3.f):Sydney harbour Bridge
Source:A+D,Oct.2006 issue

The entire area has an amorphous quality to it, what William Whyte termed as the greatest plus point of a great public place. It is a place where the young office crowd head for dinner in the gourmet seafood cafes. It is the place where the retired old ladies sit and knit sweaters.One can spend a fortune in a day at the art galleries, yet one can spend a day soaking in the atmosphere and watching people, without spending a penny. This is the place for the lovers to date and the young scholars to research over coffee.

Aboriginal artists play *dejeridoo*(a very long flute) at the place.

Plate 3.3.g):Aboriginal artists playing dejeridoo
Source:A+D,Oct.2006 issue

Source:Article by NewDelhi-based Tathagata Chatterji
an architect specialising in urban designing and planning in A+D October 2006 issue.

3.4 THE PITTSBURGH RIVERFRONT DEVELOPMENT PLAN

a comprehensive plan for the three rivers

REASONS FOR SELECTION:

1. The riverfront has been developed for office, retail, residential and recreational use.
2. Inappropriate uses and practices from the rivers'edge have been prevented and where possible eliminated.
3. The natural habitat of the river has been conserved
4. The City Council and the Pittsburg planning Commission have adopted the plan.
5. The plan will be financed by the Pittsburg Development fund and tax increment financing used.

STRENGTH OF THE CASE STUDY:

1. As a way to create some continuity for policy and for riverfront character, the 36 miles of riverfront has been divided into a series of "Districts". based on common elements of topography, character, use and relationship to the river.
2. Physical and visual access to the river is encouraged by providing riverfront trails and thus the neighborhood life, commerce and recreation are pushed towards the river's edge.

SUCCESS OF THE SCHEME:

The plan is under implementation from 1997-2007. The greatest single threat to realizing the full promise of Pittsburgh's riverfront would be further piecemeal development. A riverfront divided, parcel by parcel, ignores the enormous development potential of a single, unifying riverfront greenway. Thus, a push for continuous public access is required for the full development of the city's most important natural and economic resource.

3.4.1 VISION

Pittsburgh cannot be imagined without its rivers. Each day, residents and visitors to the city cross the Allegheny, Monongahela or Ohio Rivers.
History tells how Pittsburgh never lacked uses for its rivers.

In its second century, Pittsburgh led the world's production of iron, glass and steel, all fed by the power of water. Factories shared the flat river land with railroads and barge docks, turning raw materials to finished goods. Pittsburgh's waterfront had but one master—work.

Today cities compete not just in terms of the quality of finished goods but in the quality of life. Along some of the most stunning and some of the

i):The City of Pittsburgh sits at the confluence of the Ohio, Allegheny, and Monongahela Rivers.

ii) Pittsburgh is the largest inland riverport in the United States.

Source:Website

Plate3.4.a)

most forgotten stretches of waterfront in the United States, local governments are acquiring property, adding to its value with greenways and other amenities and attracting private investment.Pittsburgh leads the region toward renewed investment in its riverfront.

The shift in the regional economy away from river oriented basic industry has left long stretches of riverfront abandoned, underused and environmentally compromised. Now, there is substantial amount of riverfront property available for redevelopment.

Today, everyone recognizes the value of public access to the waterfronts. A renewed waterfront offers investors a promising return on capital. Cities enjoy increased tourism, employment and growth. Residents gain new recreation opportunities and an expanded awareness of the natural aspects of river life. Most importantly, a vital and vibrant waterfront serves to unite residents and visitors in a shared experience of Pittsburgh, just as the public commons and main street did a century ago.

3.4.2 RIVERFRONT DEVELOPMENT PRINCIPLES

1.Insist on interconnected, linear waterfront development with broad public access by...

a) Encouraging the use of the riverfront greenway as a daily commuter path and recreational amenity.
b) Demonstrating the connection between access, greenway development and market demand.
c) Creating a coherent,visually pleasing order to the water's edge.

2. Create synergy between office, retail, residential and recreational use of key waterfront sites by...

a) Selecting the most imaginative development concepts and architectural designs.
b) Establishing the riverfront as a front door to the city.
c) Enhancing real value and competitive market advantages for private developers.

3. Protect and enhance the natural riverfront environment by...

a) Documenting the ecological state of our riverfronts in order to preserve this environmentally diverse natural habitat.
b) Preventing and, where possible, eliminating inappropriate uses and practices from the rivers' edge.
c) Protecting existing natural areas from development.

4. Reclaim Pittsburgh's identity as one of the world's great river cities by...

a) Raising public expectations of what the city's riverfront offers.
b) Attracting people, investment and the best aspects of urban living to the waterfront.

Organisation of the plan:

Pittsburgh's special geographical assets and historical features help to organize the Riverfront Development Plan around four Riverfront Districts:

a) Central District;
b) Community District;
c) Industry District; and
d) Green District.

The Plan will describe the tools used to bring development goals into focus:

a) The Recreation/Access/Tourism Plan;
b) Riverfront Zoning; and
c) The Riverfront Land Acquisition Plan.

The greatest single threat to realizing the full promise of Pittsburgh's riverfront would be further piecemeal development. A riverfront divided, parcel by parcel, ignores the enormous development potential of a single, unifying riverfront greenway. Thus, a push for continuous public access is a call for the full development of the city's most important natural and economic resource.

3.4.3 THE DISTRICTS

Pittsburgh has a diverse inventory of riverfront communities and developments with industrial, commercial, residential and mixed uses. As a way to create some continuity for policy and for riverfront character, the 36 miles of riverfront has been divided into a series of "Districts". These are areas that share common elements of topography, character, use and relationship to the river. Each of the four Riverfront Districts has a series of land use and design policies, and access and recreation goals. Uses may change over time, but the policies laid out in this plan will remain consistent guides to the relationship between buildings, streets and riverfronts.

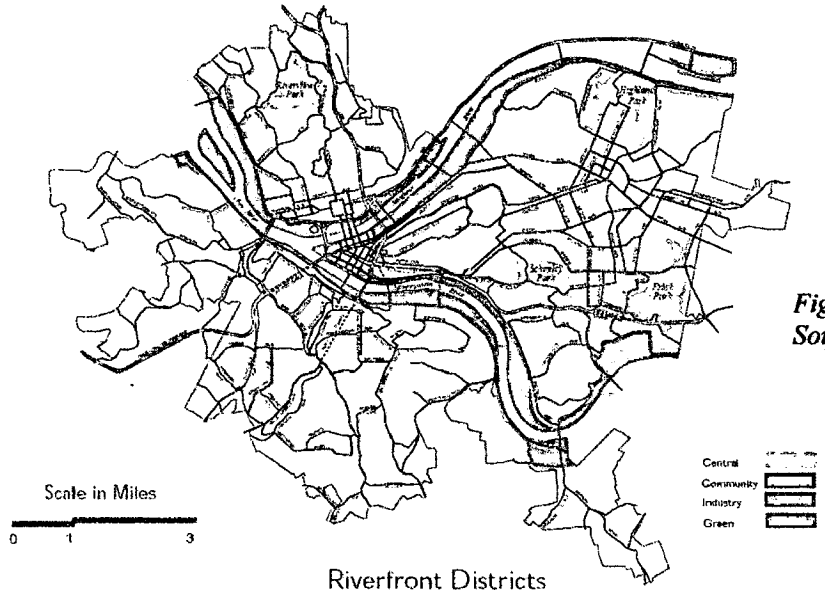


Fig.3.4.a): Map showing the riverfront district
Source: Website

3.4.3a) THE CENTRAL DISTRICT

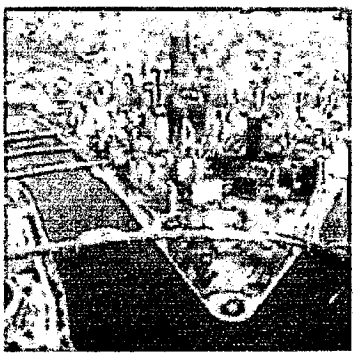


Plate 3.4.b): The view of the CentralRiverfront District from above the West End Bridge.
Source: Website

Pittsburgh's core retail, entertainment and corporate residents anchor the **Central District**, which encompasses the Golden Triangle, the North Shore and Station Square. New sports venues, an expanded convention center and new commercial development will remove remaining barriers to riverfront access,

encourage riverfront living, redefining Pittsburgh as a great river city. Multi-level parks, pedestrian-friendly corridors and river boulevards will connect the Central District's many destinations into a single, easily-negotiated and memorable experience for residents and visitors.

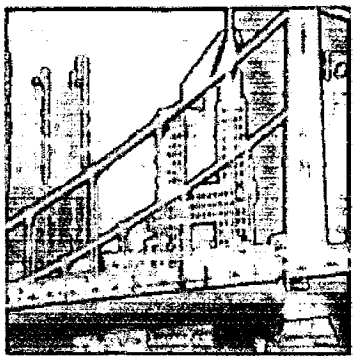


Plate 3.4.c):Landmarks of the Central District: Fifth Avenue Place,the PPG Building and the Sister Bridges.
Source:Website

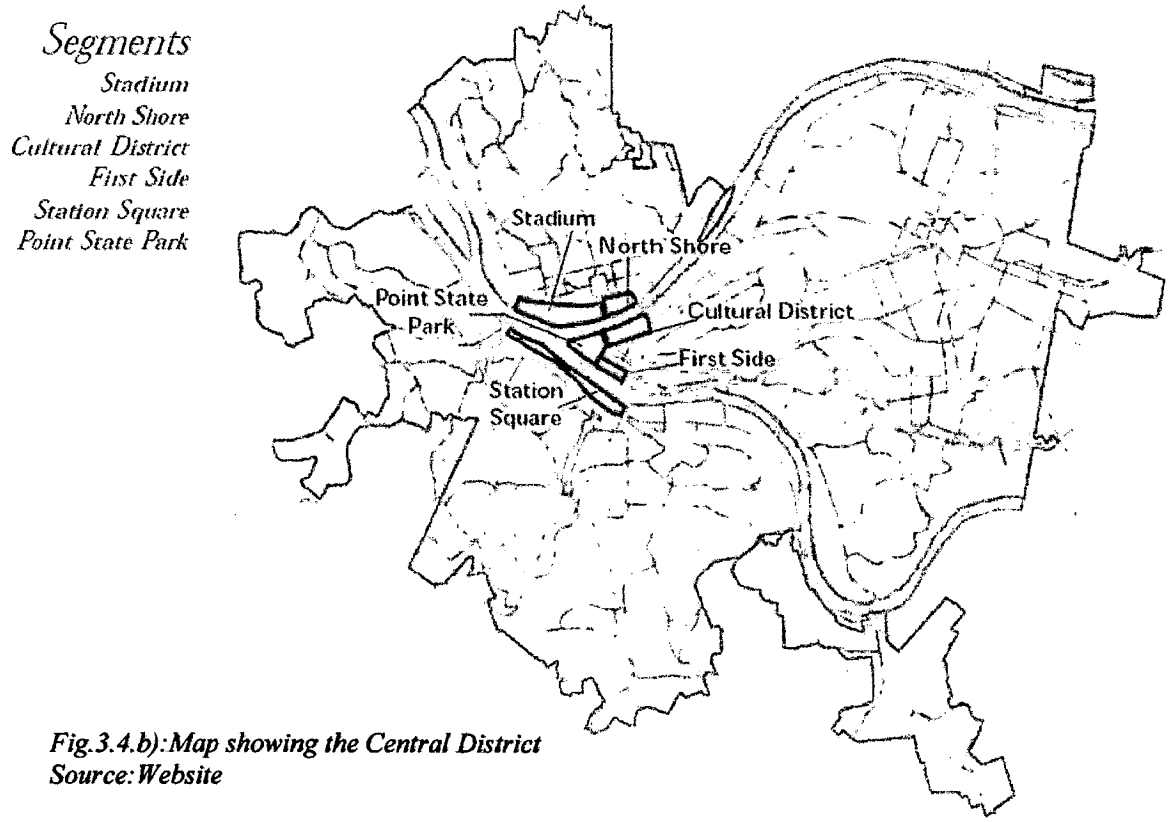


Fig.3.4.b):Map showing the Central District
Source:Website

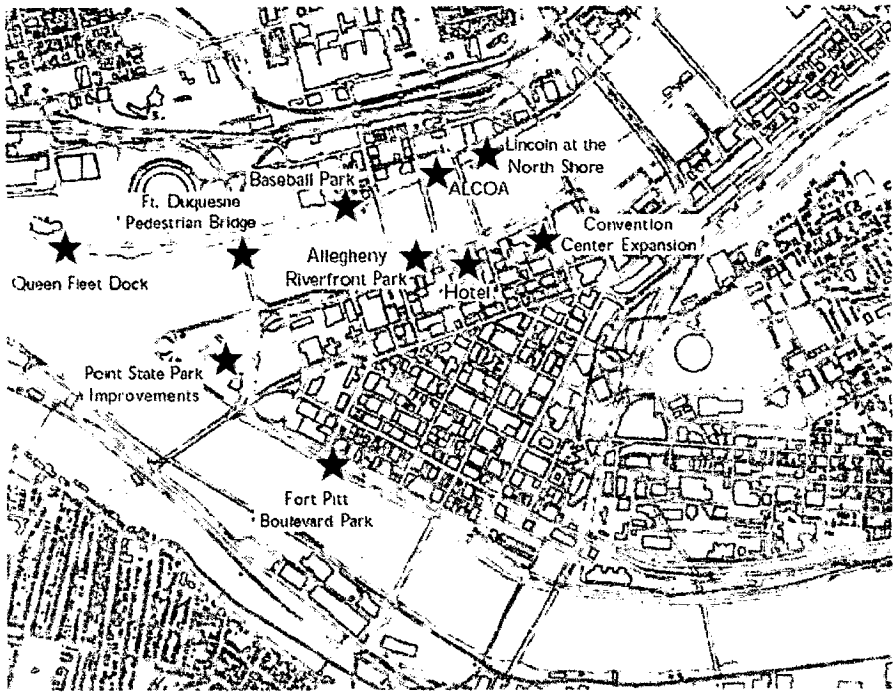
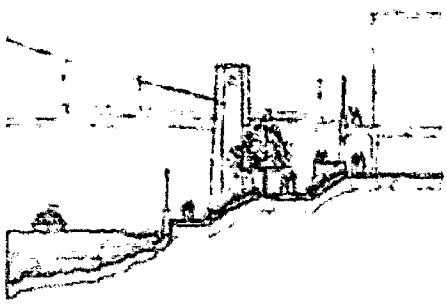


Fig. 3.4.c): Map showing the Central District
Source: Website

Design & land use policies in the Central district

1. Streets that connect to the riverfront will be designed to be pedestrian-scale with a high level of amenity.
2. Buildings on riverfront sites will have their primary facades facing the river, and will orient their required open space to the waterfront.
3. Perpendicular connections to the riverfront will be emphasized by allowing for generous pedestrian walkways back from the water.
4. Landscape design along the river will be urban in character, with harmonious retaining walls that convey a sense of continuity from one project to the next.
5. The Central District will be the primary center for regional entertainment attractions, to take advantage of the riverfront setting.
6. At least two levels of public access will be provided wherever possible: one at building level and one at water level.
7. A series of urban plazas along the riverfront will be created, framed by new and existing buildings and connected, where possible, by trails.
8. No new parking structures or lots will be permitted adjacent to the waterfront.

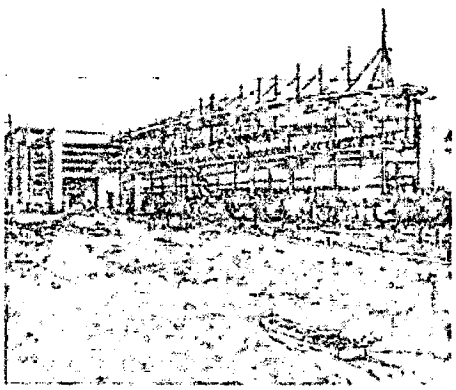
i)The SMS Building on the North Shore addresses the Allegheny River.



ii)New development will provide at least two levels of riverfront access

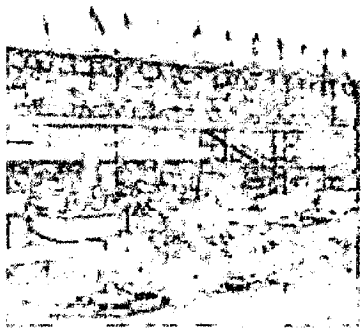
Plate 3.4.d)
Source:Website

9. The development of residential uses with river views will be encouraged where appropriate.
10. No heavy industry will be permitted in the Central District.

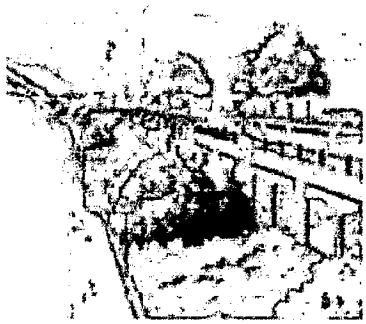


i) The proposed expansion of the Convention Center provides access to the riverfront across its entire length

ii)Access to the riverfront will be provided along the entire length of the Central District.



iii)By providing new docking facilities, the proposed Convention Center expansion extends the range of opportunities for both public boating and private ferry and shuttle services.



iv)A new park along the Monongahela River would complete the linear park system that extends around the Golden Triangle.

Plate 3.4. e)
Source: Website

3.4.3b) COMMUNITY DISTRICTS

A century of industrialization denied both physical and visual access to the rivers in **Community Districts** like Lawrenceville and South Side. Today, newly available riverfront land has reopened the door connecting these established neighborhoods—along with new communities like Washington's Landing and Nine Mile Run—to the water's edge. In all cases, new riverfront housing and neighborhood scale mixed-uses will be encouraged in these Community Districts. Riverfront trails and other means of access push neighborhood life, commerce and recreation toward the waterfront.

Plate 3.4.f):The residential streets of the South Side run perpendicular to the river, providing the opportunity for continual access.

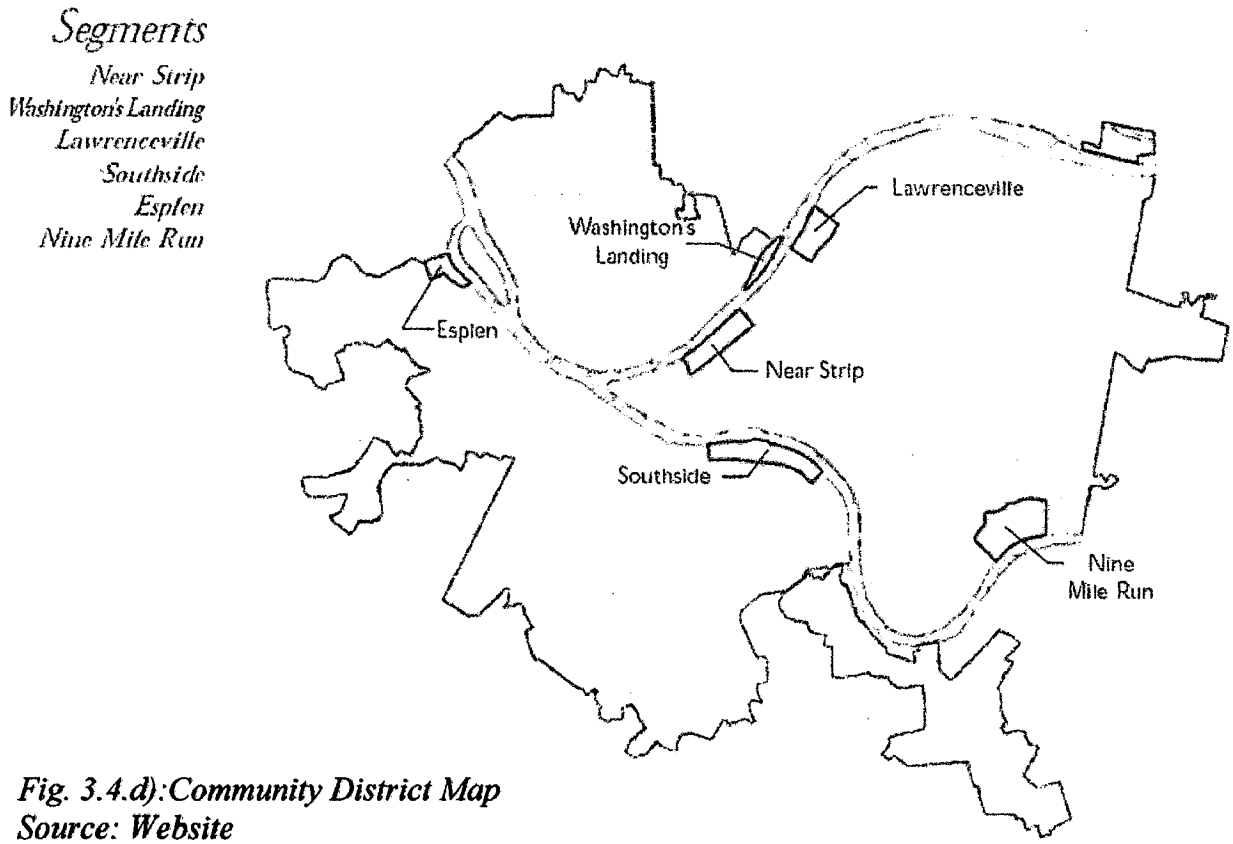
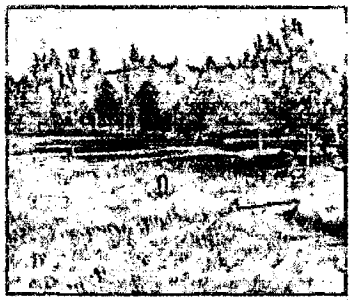


Fig. 3.4.d):Community District Map
Source: Website

Design & land use policies in the Community district

1. New development and street patterns will extend the fabric of the neighborhood to the river.
2. The river's edge will be constructed of softer materials, except for key locations of heavier use where harder edge materials are appropriate.
3. Development along the rivers should be in scale with the adjacent neighborhood, and should include a variety of uses, and housing wherever possible.
4. Heavy industrial uses will not be permitted, and no outdoor storage of industrial materials or outdoor industrial activities will be permitted.
5. Marina and other river-related uses should be developed where the size and operation is not disruptive to the neighborhood.



i)Trails and riverfront access link the residential communities to the heart of the river environment.

ii)The plans for Nine Mile Run will rehabilitate the industrial moonscape of the slag heaps into a new riverfront neighborhood.

Plate 3.4.g)
Source:website

Community district project map

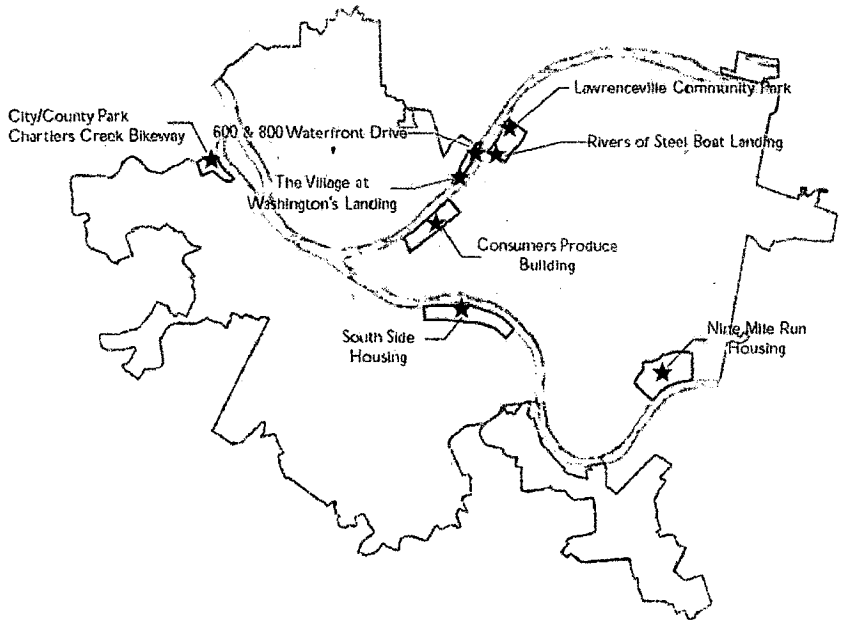
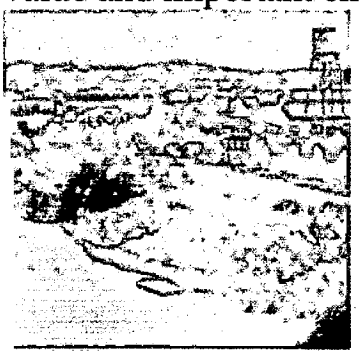


Fig. 3.4.e): Community Distric Project Map

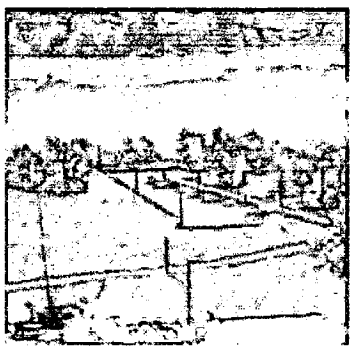
Source: website

3.4.3c) INDUSTRY DISTRICTS

The competitive advantages inherent in riverfront sites continue to strengthen **Industry Districts** in many areas of the city. Imaginative glass and metal building designs flourish on former industrial sites, showing Pittsburgh's transformation from a heavy manufacturing city to a magnet for advanced engineering, software design, and biomedicine. Flexible guidelines at these industrial locations will respond to the need for ready, regional access, security and safety. At the same time, opportunities will be identified to introduce new elements not typically associated with industry—natural green river edge spaces and public access where feasible and where such improvements provide added value and important employee amenities.

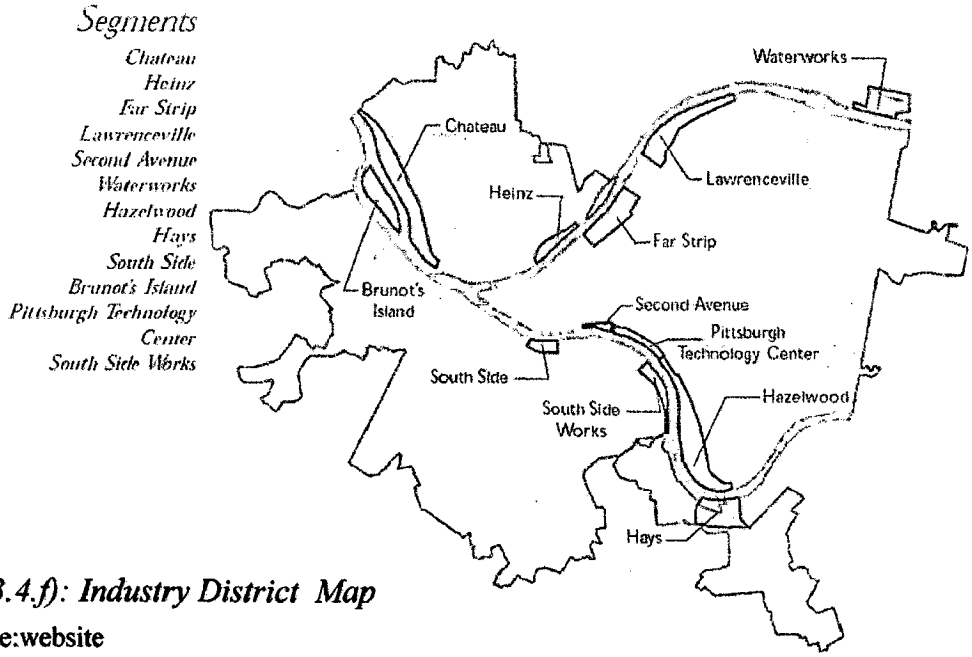


i)The Lawrenceville industrial area contains a mix of uses ranging from high tech robotics to standard warehousing.



ii)The Pittsburgh Technology Center has created open space along the river for both employees and the public

Plate 3.4.h)
Source: website



g.3.4.f): Industry District Map
urce:website

Design & land use policies in the Industry district

1. Existing public right-of-way along the rivers and to the rivers will be maintained.
2. The river's edge will be heavily landscaped in a naturalistic form along industrial properties.
3. The industrial uses along the rivers should not involve external impacts such as noise or odour.
4. Parking and service access, outdoor storage and any outdoor industrial activities will be placed in side yards or on the sides of buildings which do not face the river, with opaque screening between these activities and the riverfront.
5. The river edge, or the inbound side of the river avenues, will be developed with a continuous frontage of building mass or landscape.
6. Utilities will be located underground or on sides of buildings which do not face the river.

i): The river's edge along the Waterworks is an example of a hard edged treatment

ii) Where necessary, public access can be seperated from industrial uses by fencing and landscaping

Plate 3.4.i)
Source: website

Industry district project map

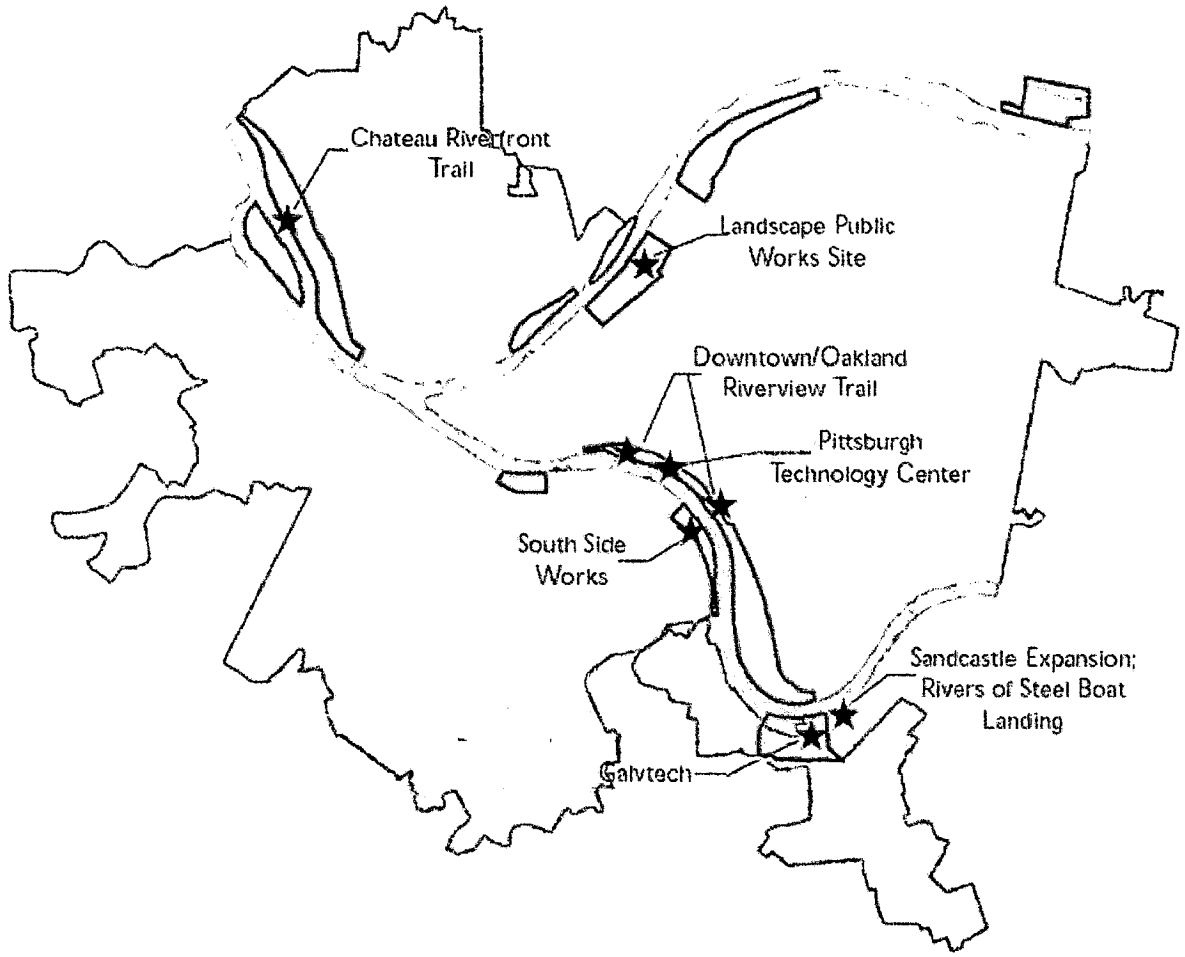


Fig.3.4.g): Industry District Project Map
Source:website

3.4.3d) GREEN DISTRICT

The densely wooded hillsides of the **Green Districts**-often steep drops-remain an essential feature and part of the diverse character of Pittsburgh's riverfront.

Restoration of natural areas and preservation of wildlife habitats will be a primary focus of development policy in these districts. These natural areas provide a visual connection between the rivers and the people who come in contact with them either while driving along one of the city's major arterials or walking along our expanding riverfront trail system.

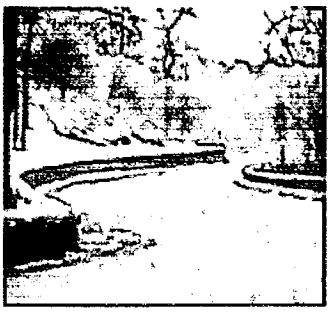


Plate 3.4.j):Pittsburgh's form is defined by its natural features and its extensive park system.

Plate 3.4.k):Bikers will be able to travel from Schenley Park to Point State Park on the Eliza Furnace Trail

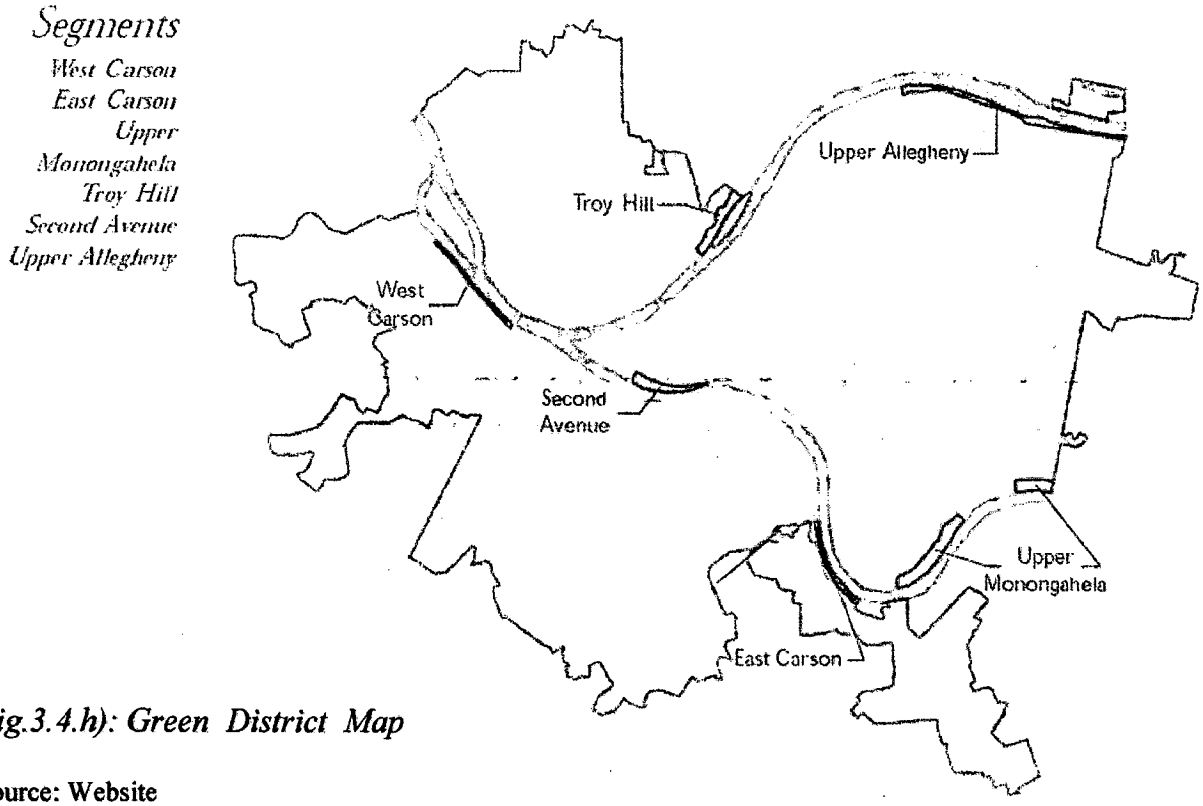


Fig.3.4.h): Green District Map

Source: Website

Design & land use policies in the Green district

1. The river's edge will be maintained in as natural a state as possible.
2. Natural ecosystems should be restored where necessary.
3. Slope areas should be stabilized to prevent any erosion and maintain a green edge to the river.

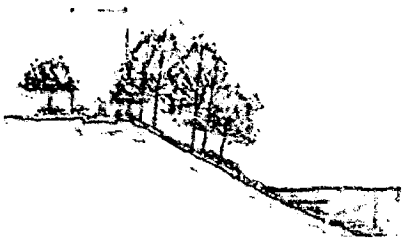


Plate 3.4.l):Trails will be constructed so as to minimize impacts on the natural slopes

Plate 3.4.m):An example of a trail using soft materials
Source: website

4. Any infrastructure improvements, including roads, rail lines or highways, will be constructed to minimize impacts on slopes and vegetation.
5. Utility lines will be placed underground or away from the rivers.
6. Riverfront trails will be designed to use soft materials which minimize impacts, and to discourage pedestrian intrusion into natural areas off the trail.
7. Substantial construction, including building development, retaining walls, and infrastructure development, will be discouraged; marinas will not be developed in this district.

Plate 3.4.n):Pittsburgh remains one of the most heavily forested urban landscapes

Source: website

Green district project map

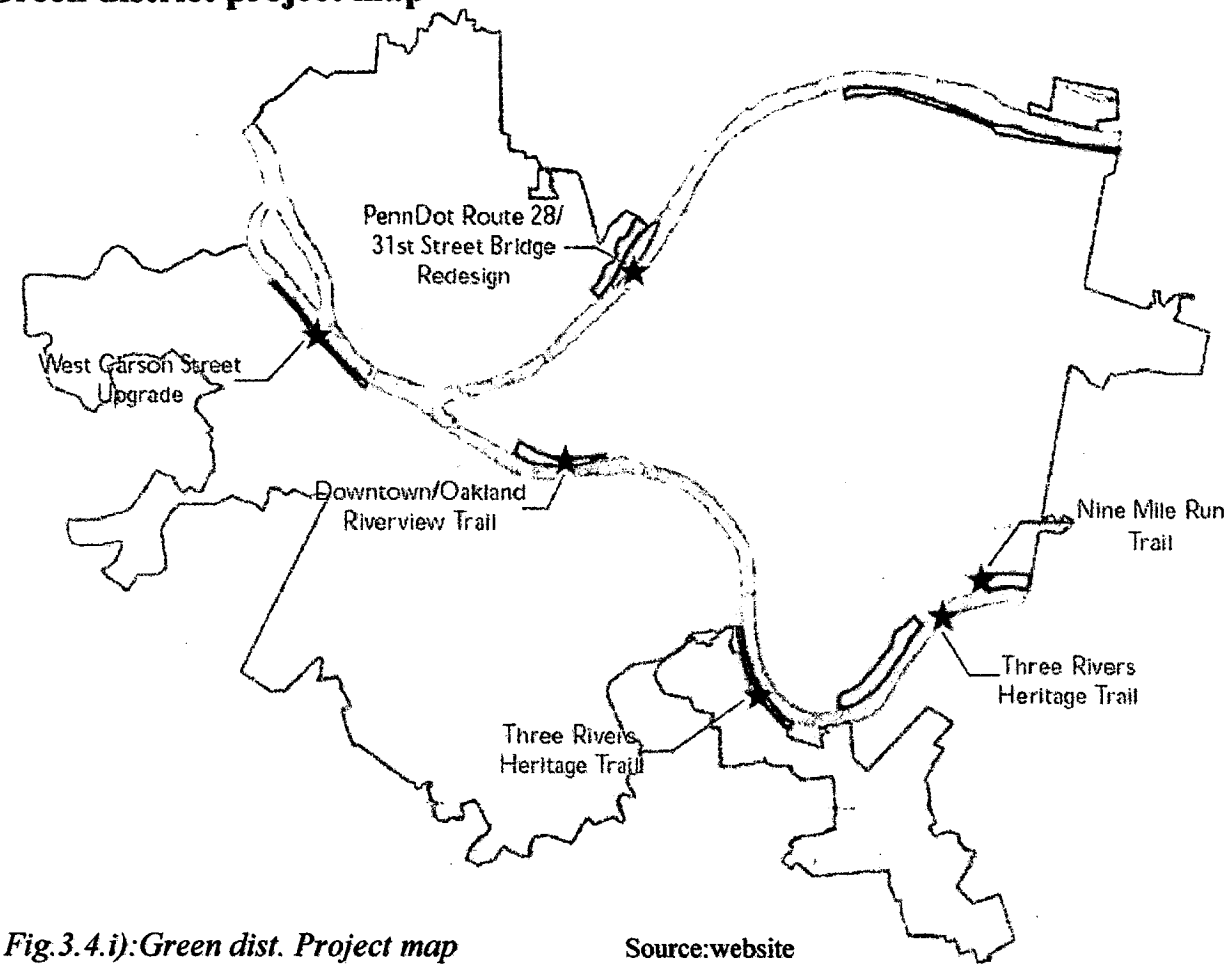


Fig.3.4.i):Green dist. Project map Source:website

3.4.4 RIVERFRONT ZONING

The city government has the responsibility to promote and direct the evolution of its waterfront. An important tool for that promotion is zoning. Zoning allows the city to guide the use of land, the height and design of structures, the lot area that structures occupy, and promote public access.

Plate 3.4.o):The downtown riverfront is unique in many ways and has a special zoning designation, the "Downtown Riverfront District".

Source:website

3.4.5 ACQUISITION OF RIVERFRONT LAND

Since 1994, the City of Pittsburgh has made riverfront land acquisition a top priority. As a result, the city now controls nearly 16 miles of its 35 miles of riverfront. Approximately, twelve miles of riverfront are under full city control while another four miles are partially controlled (a narrow strip of intervening property exists between city land and the river).

Financing Tools

Two innovative financing mechanisms, the Pittsburgh Development Fund and use of tax increment financing, have made these and other land acquisitions possible.

These financing tools, along with a range of loans, bond issues, state and federal matching programs, and other funding sources, give the City of Pittsburgh a pivotal development role: identifying important land assets and attracting new investment.

3.4.6. PLAN DEVELOPMENT AND IMPLEMENTATION:1997-2007

The following steps will be taken to implement the plan:

1. The plan will be reviewed by City Council and the Pittsburgh Planning Commission. Planning Commission will adopt the plan.
2. The design and land use policies for each district will be used as the review criteria by Department of City Planning staff.There will be site specific review for all riverfront projects.
3. Trail development will be coordinated with its neighboring housing, commercial and industrial development. The trail plan outlines the priority sequence of trail development. The trail segments will be completed first, with trail amenities developed and implemented second.

Those amenities include signage, benches, trail heads, trash receptacles and landscaping.

4. This Riverfront Plan will be used in conjunction with other planning documents that impact the riverfronts, including the Downtown Plan and the Public Art Plan for Pittsburgh.

3.5 INFERENCES

The study of The Thames, Sydney waterfront and Pittsburgh riverfronts shows that the rivers have been revived and put to various uses by the continuous efforts of the Government and support of the people. These efforts have been very successful and the rivers have gained their identity again. The various issues relating to pollution, restoration of wildlife and recreational and residential development have been addressed.

References

1. Frederick Gibbard, Town Design, The Architectural Press, London
2. Article by Tathagata Chatterji 'SYDNEY WATERFRONT'in magazine A+D,Oct.2006 issue.

Source of photographs from the websites are as below:

1. www.visitthames.co.uk
2. www.sydney-australia.biz
3. www.city.pittsburgh.pa.us/rfp

Source of photographs from 3.3.a) to 3.3.g) is Article by Tathagata Chatterji 'SYDNEY WATERFRONT'in magazine A+D,Oct.2006 issue.

Chapter 4
CASESTUDIES : INDIAN CONTEXT

4.1 INTRODUCTION

This chapter discusses some of the Indian riverfronts where efforts have been made by the Govt. for their revival. The riverfronts discussed are the Sabarmati riverfront at Ahmedabad, the ghats of Haridwar and Banaras as religious riverfronts and at last the problems faced with the development of Yamuna riverfront in Delhi and the Hoogly riverfront in Kolkata. This will give an overview of the various possibilities and limitations of riverfront development in India.

4.2 THE SABARMATI RIVERFRONT,AHMEDABAD

REASONS FOR SELECTION:

1. The project has been planned as a self financing project. Revenues will be generated from the sale of a portion of the reclaimed land.
2. The Ahmedabad Municipal Corporation has formed Sabarmati River Front Development Corporation Limited (SRFDCL) as a Special Purpose Vehicle for developing the riverfront.It will be independent of all political changes.
3. The project provides for multi-dimensional development with the provision of recreational, commercial, residential facilities.

STRENGTH OF THE CASE STUDY:

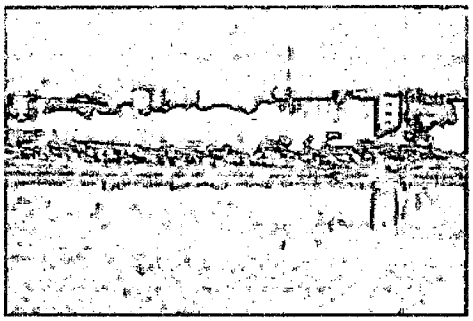
1. The project will provide for city level recreational spaces.
2. Recharge of ground water acquifiers.
3. Strengthening of transportation network of the city.
4. The flood hazard will be eliminated and proper flood management will be done.
5. The slums will be rehabilitated and relocated.

SUCCESS OF THE SCHEME:

The scheme is under implementation and will help in the revival of the riverfront.

4.2.1 INTRODUCTION

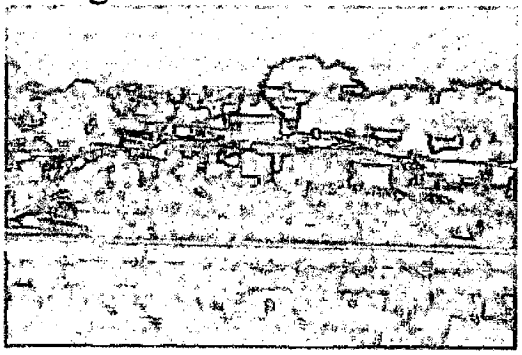
Ahmedabad, seventh largest populous city of India and Commercial Capital of Gujarat State is recognized by River Sabarmati and Gandhi Ashram established on its western Bank (Famous World over by Name Satyagrah Ashram).The City is spread over an area of 190.84 sq.km. The River Sabarmati flows from north to south in the center of the city and splits the city in almost two equal parts. The city encompasses population of about 4.5 million. River Sabarmati is backbone of the development of Urban Sprawl of Ahmedabad.



At present the riverfront lies neglected and characterized by unimaginative and unplanned development. It's potential to provide city level social infrastructure and recreation facilities lie untapped.

Plate 4.2.a): View of Sabarmati river
Source: Author

Though it is a major source of water for the city and despite the building of a major barrage to retain water, except for a few months during the monsoon the river is dry. Sewage contaminated storm water out-falls and the dumping of industrial waste pose a major health and environmental hazard.The riverbank slums are disastrously flood prone and lack basic infrastructure services. The slums located along the riverbed also pose a major impediment to the efficient management of monsoon floods in the river.



It has long been acknowledged that appropriate development of the riverfront can turn the river into a major asset, which can improve the quality of environment and life in Ahmedabad and improve the efficiency of its infrastructure.

Plate 4.2.b): Pollution in Sabarmati river
Source: Author

In May 1997, the Ahmedabad Municipal Corporation established the Sabarmati River Front Development Corporation Limited (SRFDCL) under Section 149 (3) of the Companies Act 1956. The SRFDCL was provided with seed capital of

Rs. one crore and charged with the responsibility of developing the Sabarmati Riverfront. In August 1997, the SRFDCL appointed Environmental Planning Collaborative (EPC) a city based not for profit urban planning and urban development management consulting firm to prepare a comprehensive proposal for the development of the Sabarmati Riverfront.

4.2.2. EARLIER STUDIES AND PROPOSALS

1. **Proposal for Integrated Planning and Development of the Sabarmati Riverfront by Mr. Bernard Kohn (1961):** Mr. Bernard Kohn was a French architect residing in Ahmedabad during the early 60's. He visualized the development of the Sabarmati Riverfront with a mix of commercial, recreational and residential developments along both the banks of the river from Gandhi Bridge to Sardar Bridge. He proposed for reclamation of about 30 ha of land, of which a part was to be sold or leased for commercial development. The proposal showed that the entire development could be self-financing.
2. **Technical Studies Commissioned by the Government of Gujarat:**
   a) Technical Feasibility Study by CWPRS, Khadakvasla (1966): It included hydraulic studies using physical models to simulate water flows in the river. It concluded that the Kohn Proposal was technically feasible.
   b) Contour Survey :The Sabarmati Barrage Division carried out a detailed contour survey of the river.
3. **The River Front Development Group Proposal - RFDG (1976):** This proposal was prepared by a group of local professional firms including Ahmedabad Study Action Group, Design Associates, Architects, M/s Hasmukh C. Patel,Architects, M/s K. B. Mehta, Builders and Engineers, Vakil-Mehta-Sheth, Consulting Engineers and Virat Thakore, Urban Designer. It was conceptually similar to the Kohn Proposal but suggested an incremental approach to reduce the need for initial capital outlay.
4. **National River Conservation Plan -NRCP (1992):** In 1992, Sabarmati River was included in the National River Conservation Plan (NRCP). The main thrust of the Sabarmati River Cleaning Project (SRCP) under NRCP Project is to stop sewage from entering the river through the storm water drainage system. More specifically it proposes interception and diversion works,the construction of trunk sewers and pumping stations in the periphery of the city, the desilting of storm water drains, the up-gradation of existing sewage

treatment plants and the provision of sanitation infrastructure in river bank slums.

5. **Sabarmati River Front Development - Feasibility Report, CEPT (1997):**
   The CEPT Proposal provided for the riverfront from Subhash Bridge to Vasna Barrage,a set of publicly accessible open spaces and recreational areas connected by walkways and promenades. It also proposed for the reclamation of 30 ha (as proposed by the Kohn Proposal) and in addition to that the reclamation of a strip of 20 meters along the west bank and 10 meters along the east bank. The proposal presumes the completion of the ongoing NRCP project to tackle the problem of sewage entering the river. The proposal suggests the formation of detailed urban design guidelines for each zone. It suggests that the entire riverfront development can be self-financing.

4.2.3. THE RIVER

River Sabarmati originate from ranges of Aravalli and traverses a stretch of about 400 Km. Owing to the construction of Dharoi Dam, Sabarmati carries only Dry Weather Flow without any assimilative capacity and starts stinking right at the beginning of the city since major storm water outlets discharges Sewage and Industrial waste waters.

4.2.3a) Physical features of the river

A total of 1033.17 ha was surveyed. This included a 10 km stretch of the river from the Sabarmati Railway Bridge at Dufnala up to one km downstream of Vasna Barrage. On the eastern side, the survey covered up to 100 m from the riverbank or up to the immediate major road (whichever was more). On the western side the survey extended up to Ashram Road.

Key Findings

1. The river runs a meandering course of about 9 kms from Subhash Bridge up to the Vasna Barrage through the city with an average width varying from 325 to 500 m.
2. The average reduced levels (RL) of the riverbed at Subhash bridge (extreme north of the City) and Vasna Barrage (extreme south of the City) are 39.2 m and 37.4 m respectively, the slope of the river is 1:5000. The height of the banks ranges from 4 to 9 mts.
3. A negative slope is observed from Sardar Bridge to Vasna Barrage.

4. The edge is not clearly defined by embankments or retaining walls at most places. The river edge gently slopes down to the riverbed at several places, which have vegetation and have been encroached by slum settlements.
5. The RL of the top gate of the Vasna Barrage is 41.756 m. Filling Vasna Barrage up to this level results in flooding of the nearby areas in monsoons.

4.2.3b) River hydraulics

The impact of building embankments and reclaiming land along the river front on the dynamics of the river, scouring of the riverbed and on the stability of bridges was analysed in detail. Various heights of embankments and various waterway widths were taken into consideration to arrive at the proposed design.

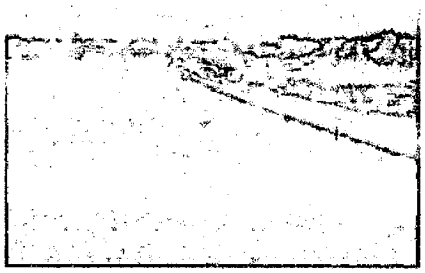


Plate 4.2.c): The Sabarmati river
Source: Author

The fundamental objective of the design was to ensure that the building of the embankments and narrowing of the waterway does not in any way raise the high flood level beyond what can be expected in the present condition of the river. A secondary objective was to ensure flood control in the low-lying areas of Ahmedabad.

Findings

The estimation of HFLs for a 5 lakh cusec flood, analysis of required embankment heights and existing riverbank levels showed that, of the three different waterway widths, a width of 275 m was optimal to achieve the objectives of the design.

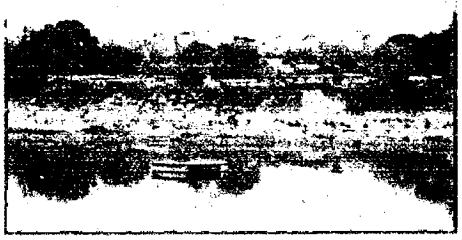


Plate 4.2.d): The Sabarmati banks
Source: Author

4.2.3c) Land Reclamation and Embankments

Land Reclamation

The pattern of existing land uses, potential for incorporating new developments and technical issues (pertaining to river hydraulics and embankment design) were prime considerations in determining the alignment of the proposed 275 m waterway. It is proposed that a total of 162.799 ha of land be reclaimed.

Plate 4.2.e): The leveling of land
Source: SRFDCL Ahmedabad

It is proposed that the soil from the riverbed will be used for filling. The soil being sandy will considerably ease the process of filling and compaction. Option of utilization of fly ash is also explored.

Embankments

The studies revealed that Reinforced Earth Panel Technology is most effective from various angles and the same be used for constructing the embankments.

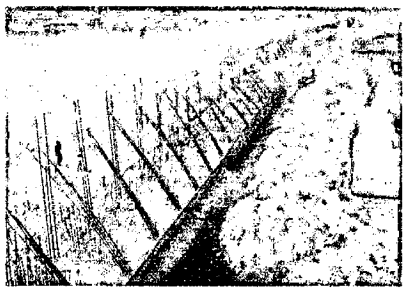


Plate 4.2.f):Embankments being constructed on site
Source: Primary

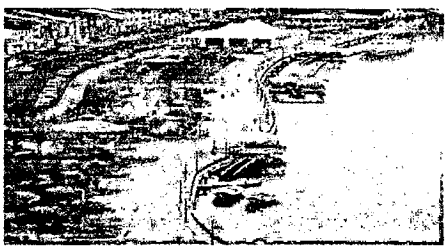


Plate 4.2.g): The Sabarmati proposals
Source:website

4.2.3d) Land Ownership

Table 4.2.1: Land Ownership

Section	Reclaimed Land	Land under Pvt Own.	Land under AMC, GoG
East Bank (Subhash-Gandhi Bridge)	41.823	2.030	39.793
West Bank (Stretch 1)	13.949	0.221	13.728
West bank (Stretch 2)	2.826	0.000	2.826
Total	**58.598**	**2.251**	**56.347**

[Source: SRFDCL Report]

For the purpose of estimating project costs, the cost of reclaiming the entire 162.80 ha has been considered. Therefore the cost of reclaiming the area that may not eventually be available for development has been included.

To make the proposal financially feasible without having to rely on public expenditure the proposal envisages the sale of a portion of the reclaimed land to raise resources for the entire development.

4.2.3e) Ground Water Recharge:

The combination of city owned and private tube-wells is depleting the supplies resulting in rapid drop of 2 m per year in the water table. This pattern of water consumption is obviously unsustainable in the long run.The construction of embankments will make it possible to retain water till the top of Vasna Barrage. Retaining water in the river will have a positive effect on the recharging of ground water aquifers and considerably decrease the presently rapid fall in the water table in the city area.

4.2.4 FUTURE

4.2.4a) Land Use and Road Network

The main considerations in allocating land uses were: existing land uses along the river; extent, location and configuration of reclaimed land available; potential for development; the structural road network and form of the city; bridges proposed in the Ahmedabad Development Plan and, the possibility of providing adequate infrastructure. The primary objective of the planning exercise was to maximize city level benefits by the provision of ample public facilities. A secondary objective was to optimize revenue potential of land allocated for sale - to finance the project.

Table 4.2.2: Proposed Land Use

No.	Proposed Land Uses	Area (Ha)	Area (%)
1	Roads	46.45	28.53
2	Gardens	42.80	26.29
3	Promenades	9.80	6.02
4	Relocation Sites	15.48	9.50
5	Informal Markets	5.86	3.60
6	Commercial Areas(to be sold)	22.15	13.61
7	Residential Areas(to be sold)	12.47	7.66
8	Public Utilities	0.77	0.47
9	Extension of Public Facilities	0.94	0.58
10	Residual / Unallocated	6.08	3.74
Total		**162.80**	**100**

[Source: SRFDCL Report]

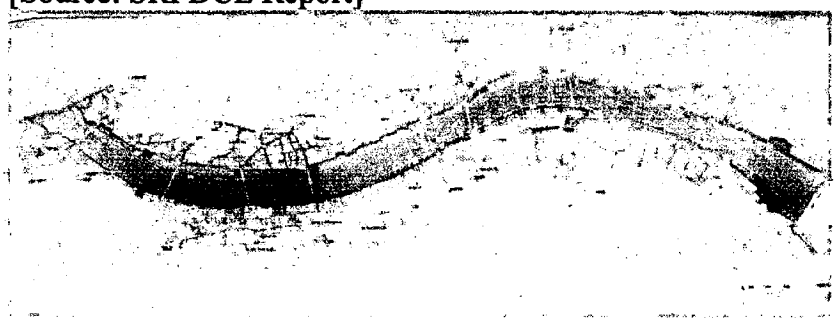


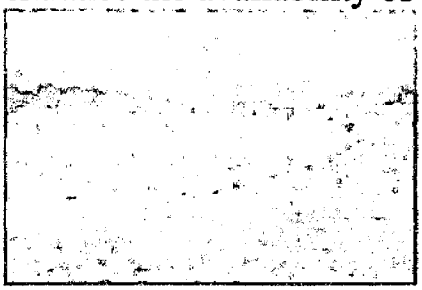
Fig.4.2.a)Proposed Landuse map
Source: SRFDCL Report

Roads

A 6 lane wide road, the 'East River Drive', is proposed along the east bank and a 4 lane wide road, the 'West River Drive', is proposed along the west bank. In addition to these two major arterial roads, it is proposed to widen and upgrade roads providing access to the reclaimed area,to establish new access roads and to improve/rationalize key road junctions.

Parks and Gardens

Some of these are expected to serve as city level green spaces while others as neighborhood parks. These additions in the heart of the city will considerably enhance the availability of open space for the densest areas of the city.



Promenades

The plan contains specific proposals for the development of promenades along the river.

Plate 4.2.h): The Sabarmati banks
Source:Author

Resettlement and Rehabilitation:

The land is allocated in three pieces at separate locations. They are Dudheshwar,Gaikwad Haveli and Paldi relocation site. This ensures that none of the project affected persons will have to move. too far from their present location.

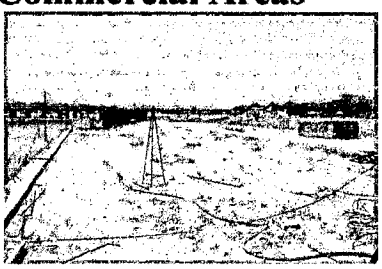
Plate 4.2.i): Slums along the river
Source:Author

A detailed survey has identified that 4400 households will be affected by the Sabarmati Riverfront Development Project. To calculate the amount of land required for relocation the size of new dwelling units is considered to be 25 sq m.

Informal Markets

A total of 3.46 ha of reclaimed land has been allocated for the expansion and upgrading of two informal markets along and on the riverbed: the Sunday Market (Gujri) at the foot of the Ellis Bridge and the Phool Bazar adjacent to the Sardar Bridge. Both of these are economically and culturally very significant - particularly for the poor. Also, it is proposed to create two new informal markets, one near Gandhi Bridge on the east bank (1.4 ha) and the other at Usmanpura on the west bank (1 ha). It is estimated that the four markets will generate a direct employment of approximately 14,000 jobs.

Commercial Areas



The land is allocated in five patches. Existing land use patterns and the potential for development were considered in locating these patches. Development in these plots will be controlled by Urban Design Guidelines.

Plate 4.2.j): Construction at site
Source:Author

This will ensure that renewed waterfront of Ahmedabad will be harmoniously and aesthetically built.

Residential

It is proposed that a total of 12.47 ha of the reclaimed land be sold for

residential development. The land is allocated in two patches. Existing land use patterns and the potential for development were considered in locating these patches.

Public Utilities
It is proposed that 0.94 ha of the reclaimed land between Subhash Bridge and Proposed Bridge 1 be allocated for a bus terminal.In addition to this it is proposed that strategically located portions of the unallocated land may be used for other city level public utilities such as the Municipal Corporation's Fire Service and Water Supply Service.

Extension of Public Facilities
It is proposed that a few small and odd pockets of reclaimed land left in between proposed roads and the V S Hospital and the National Institute of Design be amalgamated with the existing plots. They are otherwise difficult to develop into any substantial facility and it is unlikely that they can be sold for development.

Unallocated / Residual
A total of 6.08 ha of the reclaimed land is not allocated as yet. This area is likely to be reduced after reconciliation of property rights. Following more detailed planning some strategically located portions will be used for providing public utilities and informal markets on the west bank and some of the land will be available for sale for residential and commercial development.

4.2.4b) INFRASTRUCTURE SERVICES

Water Supply
It is proposed to lay 0.5 m diameter HDPE (6 kg/sq cm) water mains on east and west banks and 6" diameter HDPE (6 kg/sq cm) branch lines to serve the requirements of the proposed new developments.

Sewerage
It is proposed to lay trunk sewers parallel to (underneath) the riverside roads on both banks - the East River Drive and the West River Drive. They will terminate at the sewage treatment facilities located near Vasna Barrage. The sewage load of the proposed new developments is assumed as 80% of the water supply load (excluding the water requirement for gardens and tree plantations).

Storm Water Drainage

At present a number of storm water drains flow into the river, upstream from Vasna Barrage. Many of them are also being illegally used to drain sewage directly into the river. With the retention of water in the river and reclamation of land along the river it will be necessary to: 1) ensure that no sewage flows through the storm water drains and, 2) extend the storm water drains through the reclaimed land and embankments. In addition to extending the storm water drains, stilling basins will also have to be provided adjacent to the embankments.

4.2.5 THE CONSTRUCTION ON THE RIVERBANK SITE IN PROGRESS:

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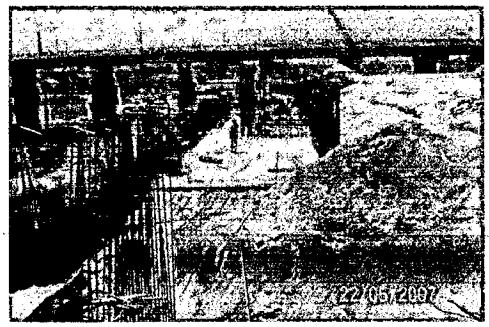

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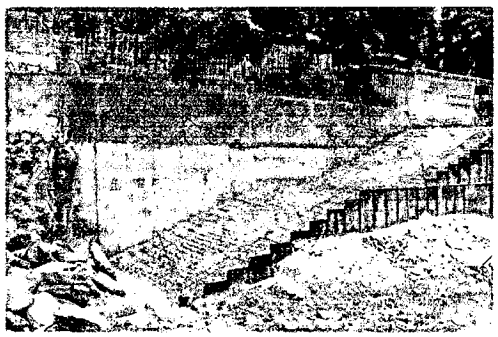

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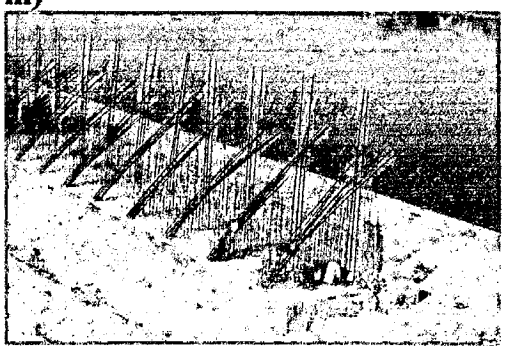


v)

vi)

Plate 4.2.k): Construction of embankments on the river bank
Source:Author

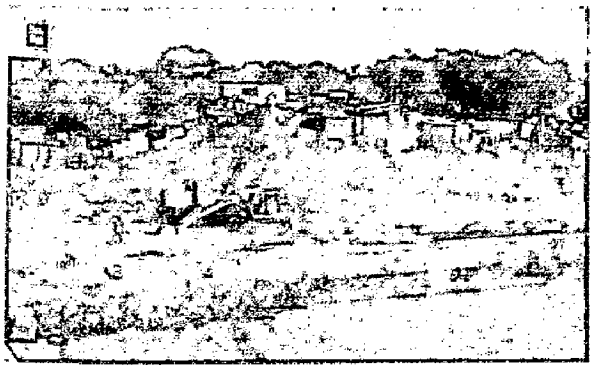


Plate 4.2.l):Slums on the river bank
Source:Author

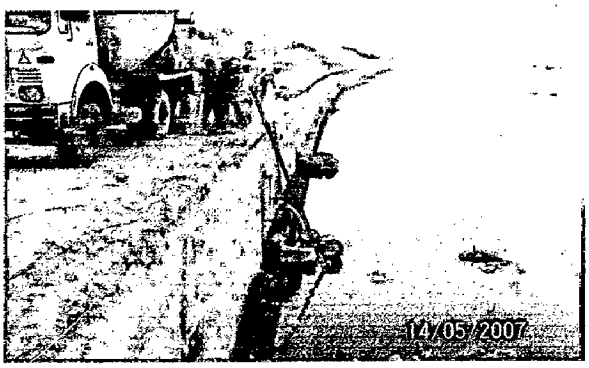


Plate 4.2.m):Pollution in the river
Source:Author

4.2.6 FINANCE

4.2.6a) Project Costs and Revenue Potential

Project Costs

At this stage of work the various SRFD Proposals have only been schematically defined. To arrive at the preliminary base cost estimate for the project, at various places, it has been necessary to use approximate quantity estimates.

Revenue Potential

It is proposed that approximately 21 percent of the reclaimed land (34.6 ha) be sold for residential or commercial development. To estimate the revenues that are likely to accrue from the sale of land, a systematic analysis of land prices along the riverbanks during the last five years was undertaken. Based on this and the proposed development of infrastructure and other facilities on the reclaimed land a forecasting exercise was carried out.

4.2.6b) Financing, Structure of the SRFDCL and Development Management

The SRFD Project

The project has been planned as a self financing project. Revenues from the sale of a portion of the reclaimed land at current prices are estimated at approximately Rs 458.54 Crores. This is roughly equivalent to the total cost of the project after the estimated base costs of Rs 360.94 Crores are spread over the projected 5 year construction period, adjusted for inflation and interest costs are added. In short,the SRFD Project is a relatively large infrastructure, public

amenities and land development project which is dependent on the sale of land to finance the project.

Sources of Funds

a) Equity Capital - The AMC has committed to capitalize the SRFDCL. In addition, title to the land, which is to be created as a result of the project, must be vested in the SRDFCL.
b) Loan Funds - Due to the timing of expenditures (over a 5 year period) and revenues (over a 10 to 12 year period), it will be necessary to borrow funds to cover the difference between the equity capital available and the cash flow requirements of the project. Every available alternative should be explored including commercial bank loans, special infrastructure loan funds and direct borrowing from the capital market through a special bond issue.
c) Proceeds from Land Sales - If properly managed, the proceeds from the sale of land created by the project should cover the full cost of the project including the cost of interest paid on construction period loans and repayment of equity investments.

Options for Managing Implementation :The SRFD Project has a relatively short implementation period and demands a wide range of technical, financial and management skills to be successful. For implementing the project, the SRFDCL can:

a) Hire in-house staff,
b) Enter into a partnership with a real-estate development firm
c) Contract out for development management services.

4.3 THE GANGES RIVERFRONT,HARIDWAR

REASONS FOR SELECTION:

1. Haridwar is one of the four sites of Kumbh mela,the other three being Ujjain,Nasik and Allahabad.
2. Permanent ghats have been developed along the course of the river.
3. There is a mix of commercial and recreational development in the area.

STRENGTH OF THE CASE STUDY:

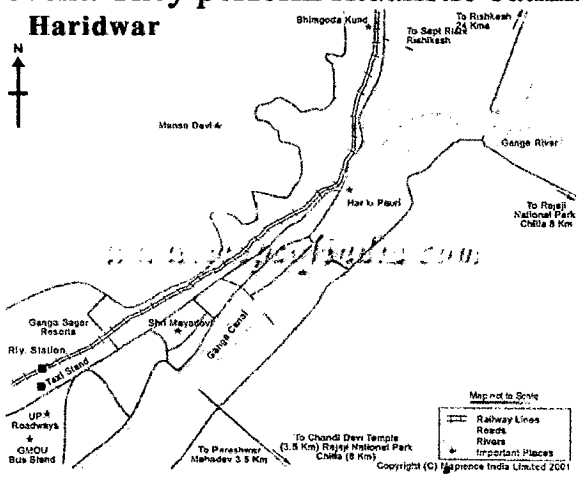
1. The riverfront attracts many tourists round the year,around 2-4 lacs every month and 25-30 lacs at the time of Kanwar mela in July.
2. Public amenities like bathing ghats,changing rooms,public toilets have been provided on the riverfront.
3. Ganga Action Plan has been launched for improving the quality of river Ganga.

SUCCESS OF THE SCHEME:

The riverfront at Har-ki-Pauri forms the focal point of the town and the religious tourism is a major source of income for the city of Haridwar.

4.3.1 INTRODUCTION:

In Hindi, Haridwar stands for *Gateway to God,* with 'Hari' meaning god and 'dwar' meaning gate. Haridwar is regarded as one of the seven holiest places to Hindus.Haridwar is one of the four pilgrim centres where the Kumbh mela is held. These four spots -- Ujjain, Haridwar, Nasik, and Allahabad -- have today become places, where the Kumbha Mela is celebrated once every 3 years in any of these 4 places and after a period of 12 years, the Maha Kumbha Mela is celebrated on the 12th year at Prayag in Allahabad. Millions of pilgrims, devotees, and tourists congregate here from all over the world to celebrate the event. They perform ritualistic bathing on the banks of the river Ganga



Haridwar is situated on a 3 km stretch of the banks of the Ganges River in the foothills of the Shivaliks . Haridwar is located at latitude 29 deg 58 min north and longitude 78 deg 10 min east.It is situated on NH – 58 between Roorkee and Rishikesh and is well connected by rail and road.

Fig.4.3a):Map of Haridwar
Source:Website

The development of the town is linear according to the topographical conditions and the Har-ki-Pauri forms the oldest part of the town and acts as a focal point.As per the 2001 census, the population of the district is 14,44,213.Haridwar district, covers an area of about 2360 sq.km.

Haridwar is one of the first towns where Ganga emerges from the mountains to touch the plains. The water in the river Ganges is mostly clear and

cool, except in the rainy season, during which soil from the upper regions flows down into it.

Plate 4.3.a):The clear and clean water of the Ganges
Source:Author

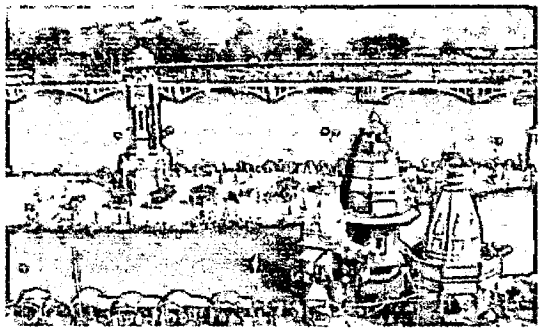


Plate 4.3b): Har-ki-Pauri

4.2.2 The GHATS:

The ghats are predominant along the course of the river and planned development for recreational use is evident by the creation of trials and seating area.The commercial development along the banks of the river opens up an opportunity to support and combine the recreational activity.Near Har-ki-Pauri the lanes and bye lanes have shops on both sides.

Plate 4.3.c): The bathing ghats
Source:Website

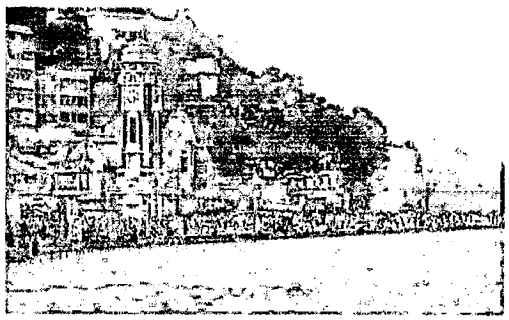


Plate 4.3.d): A mix of commercial and religious development

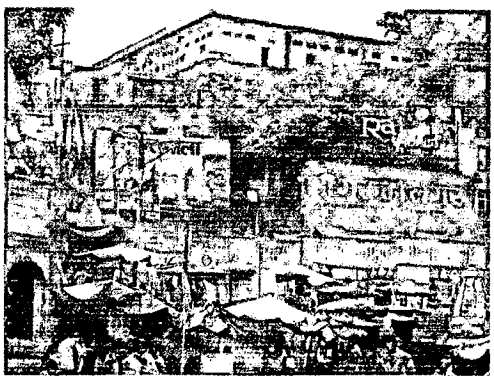


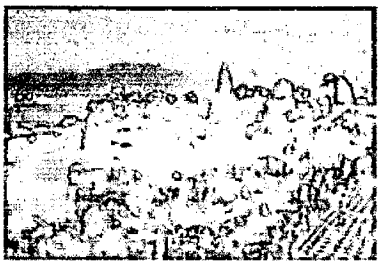
Plate 4.3.e):A mix of commercial and religious development
Source:Author

Plate 4.3.f):The permanent ghats
Source:Author

There are numerous bathing Ghats at Haridwar. The most sacred bathing spots at Haridwar are Gangadwara, Kankhal, Nila Parvata, Bilwa Teertha and Kusavarta. Hari-ki-Pairi (known for footprint of Vishnu) is the main Ghat at Haridwar.

4.2.2a) Har-ki-Pauri Ghat

This is the most sacred ghat of Haridwar; thousands of devotees and pilgrims flock here during festivals from all over India to take a holy dip.This sacred bathing ghat is also known as Brahmakund. The most fascinating sight at Haridwar is the Ganga Aarti, held every evening at 7. The Ganga Aarti is a spectacular sight as it is performed in all temples at the same time. Hundreds and thousands of devotees crowd the Ghats at Hari-ki-Pairi to participate in the evening Aarti.



A spectacle of sound and colour is seen when, after the ceremony, pilgrims float diyas (floral floats with lamps) and incense on the river, commemorating their deceased ancestors.

Plate 4.3.g):The spectacular ghats

Plate 4.3.h):The temples
Source:Author

Plate 4.3.i):Bathing at the ghats
Source:Author

Plate 4.3.j):Changing rooms provided on ghats
Source:website

Plate 4.3.k):Steps leading to water on the ghats

4.3.3 THE TEMPLES ALONG THE GHATS:

4.3.3a) Chandi Devi Temple

The temple of Chandi Devi is at the top of the Neel Parvat on the other bank of river Ganga.It is a 3 km trek from Chandighat. The area around the temple is highly landscaped and has been developed for tourism.Cable cars have been provided which take the people to the temple.All kinds of public amenities have been provided around the temple.

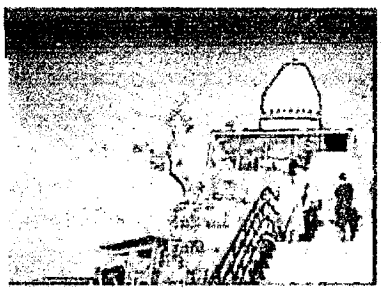


Plate 4.3.l):Chandi devi emple

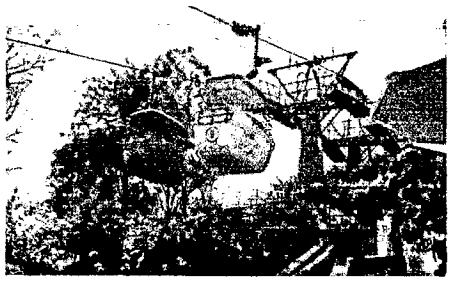


Plate 4.3.m):Cable cars leading to the temple

4.3.3b) Mansa Devi Temple

Situated at the top of Bilwa Parwat, the temple of Goddess Mansa Devi, literally meaning the Goddess who fulfills desires (Mansa), is a popular tourist destination, especially because of the cable cars, which offer a picturesque view of the entire city.

Plate 4.3.n): The temple

Plate 4.3.o): Cable cars leading to the temple
Source:website

4.3.4 TOURISM STATISTICS:

Plate 4.3p):The Kumbh
Source:website

Plate 4.3.q):The Ganges

Table 4.3.1: No.of tourists visited during Festival season(2005)

Month	Occasion	Approx. no. of tourists visited(in lacs)
January	Makar Sakranti	2-2.5
Feb.-March	Maha Shivratri	2
March-April	Ram Navami	3-4
April	Baisakhi	8-10
May	Buddha Poornima	3
May	Ganga Saptami	2
June	Ganga Dussehra	8-10
July	Kanwar mela	25-30
July	Somwati amavasya	20-25
August	Janmashtmi	1
October	Durga pooja	3
November	Kartik Poornima	7-8
Every month	Ekadashi	2
	Poornimas	2
	Amavasyas	2
	Surya Grahans	4-5
	ChandraGrahans	4

Source:Mela Bhawan,Haridwar (2005) and www.haridwar.nic.in

*[The statistics are of 2005,they are mentioned to strengthen the aspect that tourism industry is flourishing in Haridwar]

The above table shows that the months of April, June,July and November have the largest no. of tourists visiting the place every year. The range of population visiting varies from 2-4 lacs in other months to 25-30 lacs in July.This shows that Haridwar is a major religious tourist place.

The ArdhKumbh mela

The festival is religiously most important for the Hindus. At every Kumbh occassion, millions of Hindus take part in the celebrations. During 2003 Kumbh at Haridwar, more than 10 millions devotees gathered at the site. Saints, priests, and yogis from all corners of India, gathered to participate in Kumbh. Haridwar is considered very holy, due to the fact that Ganga enter plains from mountains here itself. The festival falls every 3 years and is celebrated in 4 different cities, viz., Allahabad, Haridwar, Ujjain and Nasik.

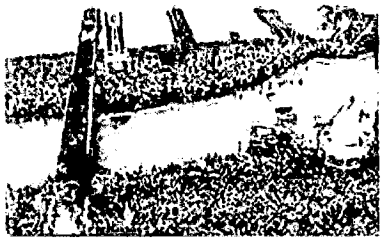


Plate 4.3.r):The Kumbh at Haridwar
Source:website

4.3.5 POLLUTION IN THE RIVER

The Central Pollution Control Board estimates that the main sources of pollution along the reach of the river are urban liquid waste (sewage/sullage), industrial liquid waste, large scale bathing of cattle, throwing of dead bodies in the river, surface run-off from solid waste landfills and dumpsites, and surface runoff from industrial solid waste landfills or dumpsites. The Central Pollution Control Board reports that three-fourths of the pollution of the river comes from the discharge of untreated municipal sewage.

4.3.6 MEASURES FOR POLLUTION ABATEMENT

1. Pollution Control Research Institute, BHEL, Ranipur, Haridwar is set up to take care of environment aspects in Haridwar. It will monitor the environmental degradation of the city
2. The Ganga Action Plan was launched in 1986. The main objective of the program was to improve the water quality of river Ganga using a multi-pronged strategy and to be financed with 100% Central assistance. The Action Plan envisaged interception and diversion of waste water reaching the Ganga and installation of Sewage Treatment Plants for its treatment. It also included other pollution control activities such as solid waste management, installation of crematoria, river front development and provisions of low cost sanitation facilities. The Plan laid emphasis on

public awareness and participation to keep the Ganga clean. Ganga Action Plan Phase I has been declared closed since 31.3.2000.

4.4 GHATS OF BANARAS

REASONS FOR SELECTION:

1. The Ganga ghats have been developed for the pilgrims who flock the place to take a dip in the holy Ganga.
2. Major public spaces have been located along the river edge including shrines,temple complexes,bathing ghats e.t.c.

STRENGTH OF THE CASE STUDY:

1. Dasaswamedh ghat is unspoilt and clean and provides a beautiful and colourful riverfront view.Various religious rites are performed on this ghat.
2. The ghats for cremation and bathing have been separated.
3. There are more than 100 ghats alongside Ganga in Varanasi.

SUCCESS OF THE SCHEME:

The river's edge is integrated with the people of Banaras.The routes leading on to the ghats being the principal routes are further emphasized by nature and extent of activity that thrives along them.

4.4.1 INTRODUCTION:

Varanasi, Kashi or Banaras, is older than traditions. These few lines by Mark Twain say it all: *"Benaras is older than history, older than tradition, older even than legend and looks twice as old as all of them put together"*. Ghats of Ganga are perhaps the holiest spots of Varanasi. They are full of pilgrims who flock the place to take a dip in the holy Ganges, which is believed to absolve one from all sins.

The city of Varanasi is located in the middle Ganga valley of North India, in the Eastern part of the state of Uttar Pradesh, along the left crescent-shaped bank of the Ganga river.Narrow lanes form an integral part of the place.The city stretches from one ghat to the other.

i) ii)

Plate 4.4.a):The Ghats of Banaras
Source:website

The street Hierarchy reflects the transition to water. The routes leading on to the ghats being the principal routes are further emphasized by the nature and extent of activity that thrives along them.

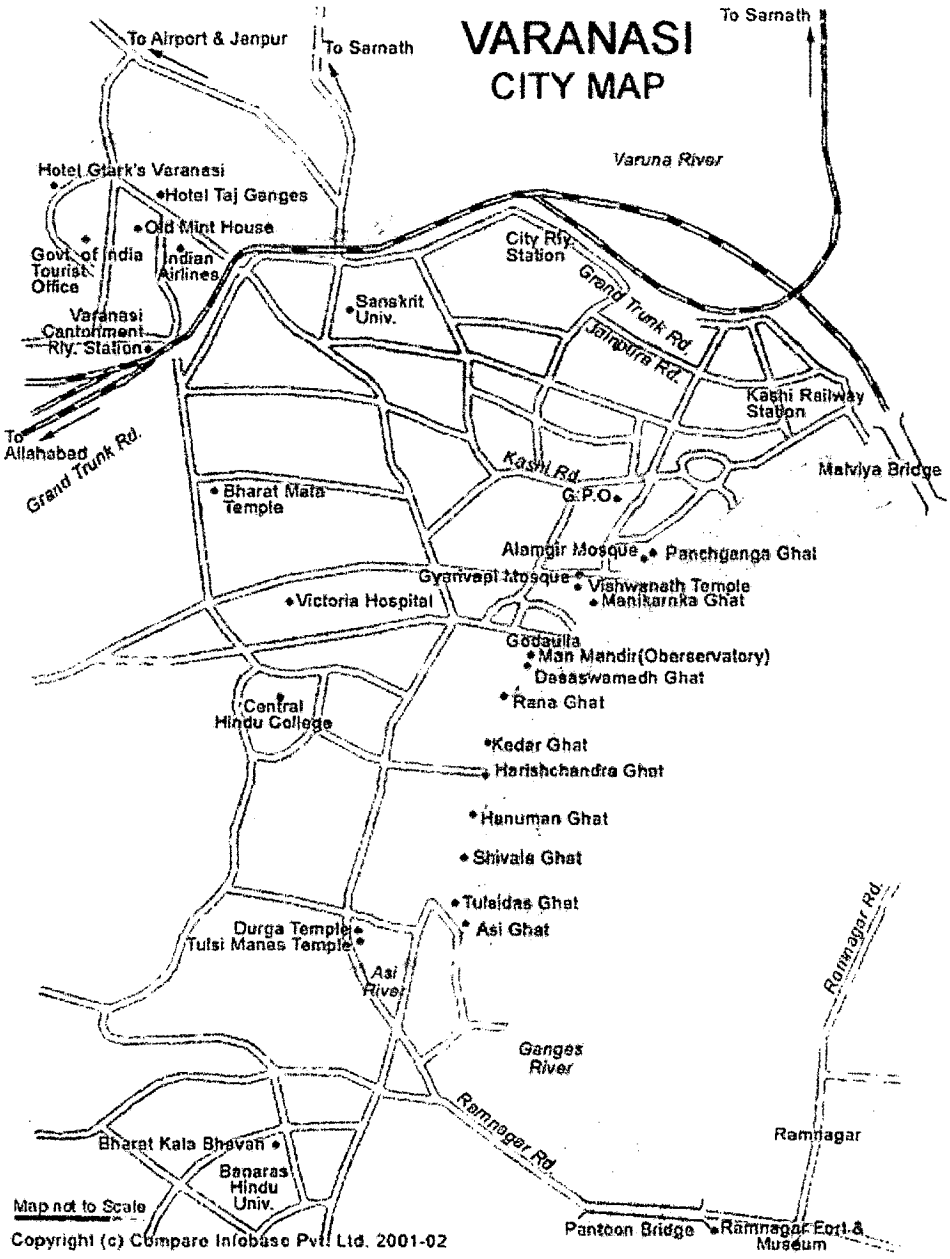


Fig.4.4.a):Varanasi City map
Source:website

A carefully organized sequence of built form and open spaces naturally flows on to open out into the river. Major public spaces are located along the river edge. A sense of continuity is achieved by repetitive images of the space configuration, shrines, activity nodes, activity along spines leading to water and to other elements like main temple complexes.

Plate 4.4.b):Varanasi Ghats
Source:website

Plate 4.4.c):Bathing on the ghats

4.4.2 THE GHATS

The Ghat area or the land-water interface is sacred or holy entity, a place of worship, a stage for celebration, for rituals & socio-cultural activities. Translated physically, this has given rise to an extremely beautiful and impressive array of structures on the edge. 100 ghats provide magnificent gateways to the river, each in its own unique way, but in totality creating the unique image of Benaras. The perception of the ghats begins much further inland. Routes leading on to them, reflect the final goal to come, the interplay of three components - streets, edge and water, in an amazingly wide range of variations, and creates an interesting interface.

There are number of temples on the bank of the Ganga river in Varanasi. It is at the Ganga Ghats where we see life and death together. For thousands of years people have been thronging these Ghats to offer their morning prayers to the rising sun. There are more than 100 ghats along side Ganga in Varanasi. ***Some of the prominent and popular Ghats at Varanasi*** are the Dasaswamedh Ghat, Manikarnika Ghat, Harischandra Ghat, Kabir Ghat and Assi Ghat.

4.4.2a) DASASWAMEDH GHAT

Plate 4.4.d):Dasaswamedh Ghat

Dasaswamedh Ghat is one of the most important Ghats of Varanasi. Dasaswamedh literally means the Ghat (river front) of ten sacrificed horses.In

spite of the fact that Dasaswamedh is one of the oldest Ghats of Varanasi, dating back to many thousand years, the Ghat has remained unspoilt and clean. Dasaswamedh provides a beautiful and colorful riverfront view. A large number of Sadhus can be seen performing religious rites on this Ghat.

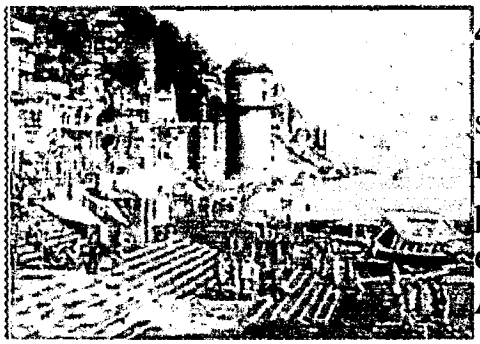


Plate 4.4.e):Assi Ghat

4.4.2b) ASSI GHAT

Assi is a clay-banked Ghat that stands at the southernmost part of Varanasi where river Assi meets Ganges. Here pilgrims bathe before paying their homage to Lord Shiva in the form of huge lingam situated under a peepal tree. Assi Ghat also constitutes the southern end of conventional city.It was at the Assi Ghat where the famous Indian poet saint, Tulsi Das had written the much-celebrated Ramcharitmanas.

4.4.2c) HARISH CHANDRA GHAT

Harish Chandra Ghat is one of the oldest Ghats of Varanasi. Harish Chandra Ghat is one of the two cremation Ghats (the other being Manikarnika Ghat) and is some times referred as Adi Manikarnika (the original creation ground). Hindus from distant places bring the dead bodies of their near and dear ones to the ghat for cremation. The Harish Chandra Ghat was somewhat modernized in late 1980's, when an electric crematorium was opened here.

4.4.2d) MANIKARNIKA GHAT

Manikarnika Ghat is the main cremation Ghat of Varanasi. Manikarnika Ghat is one of the oldest and most sacred Ghats in Benaras.
There is a sacred well at the Manikarnika Ghat called the Manikarnika Kund.

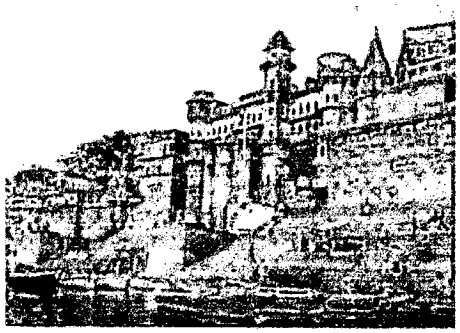


Plate 4.4.f):Manikarnika Ghat

4.4.2e) TULSI GHAT

Tulsi Ghat is named after the great Hindu poet of the 16th century, Tulsidas. It was in the year 1941 when Tulsi Ghat was made pucca (cemented) by the famous industrialist, Baldeo Das Birla. Tulsi Ghat is associated with a

number of important activities such as the sacred bath to get rid of leprosy. Tulsi Ghat is also a center of cultural activities. During Hindu lunar month of Kartika (Oct/Nov), Krishna Lila is staged here with great fanfare and devotion.

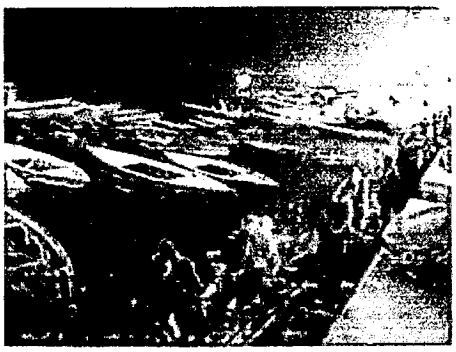


Plate 4.4.g):Boating on the ghats
Source:website

4.5 THE YAMUNA RIVERFRONT,DELHI

REASONS FOR SELECTION:

1. The development has been proposed by Govt. organisation, Delhi Development Authority.
2. It calls for putting a check on the pollution in the river.
3. The riverfront development will be in three zones. Areas prone to flooding every 25 years or less are to be maintained as pondage area with water bodies to recharge ground water. Areas prone to flooding every 50 years can have recreational facilities while areas completely safe can have public and semi-public utilities like food courts, plazas and so on.
4. It will also rehabilitate the slum settlements.

STRENGTH OF THE CASE STUDY:

1. Serious flooding on the river bed will be checked.
2. Topography will be maintained and development activities which require least amount of construction material will be allowed.
3. Areas for access and approach to the riverbed will have good quality of water, otherwise to be discouraged.
4. Permanent structures especially of residential or industrial nature will not be allowed.
5. The riverfront will provide a large open space for the people of Delhi to get recreation.

SUCCESS OF THE SCHEME:

The scheme is to be implemented. The proposal will seek to maintain an ecological balance as well as attempt to provide public spaces for the people of Delhi.

4.5.1 THE RIVER

The river Yamuna after covering a distance of about 425 kms from its origin enters Delhi at Palla in the north at an altitude of 690' above MSL to Jaitpur in the south at an altitude of 650' MSL, the total length of 50 km.

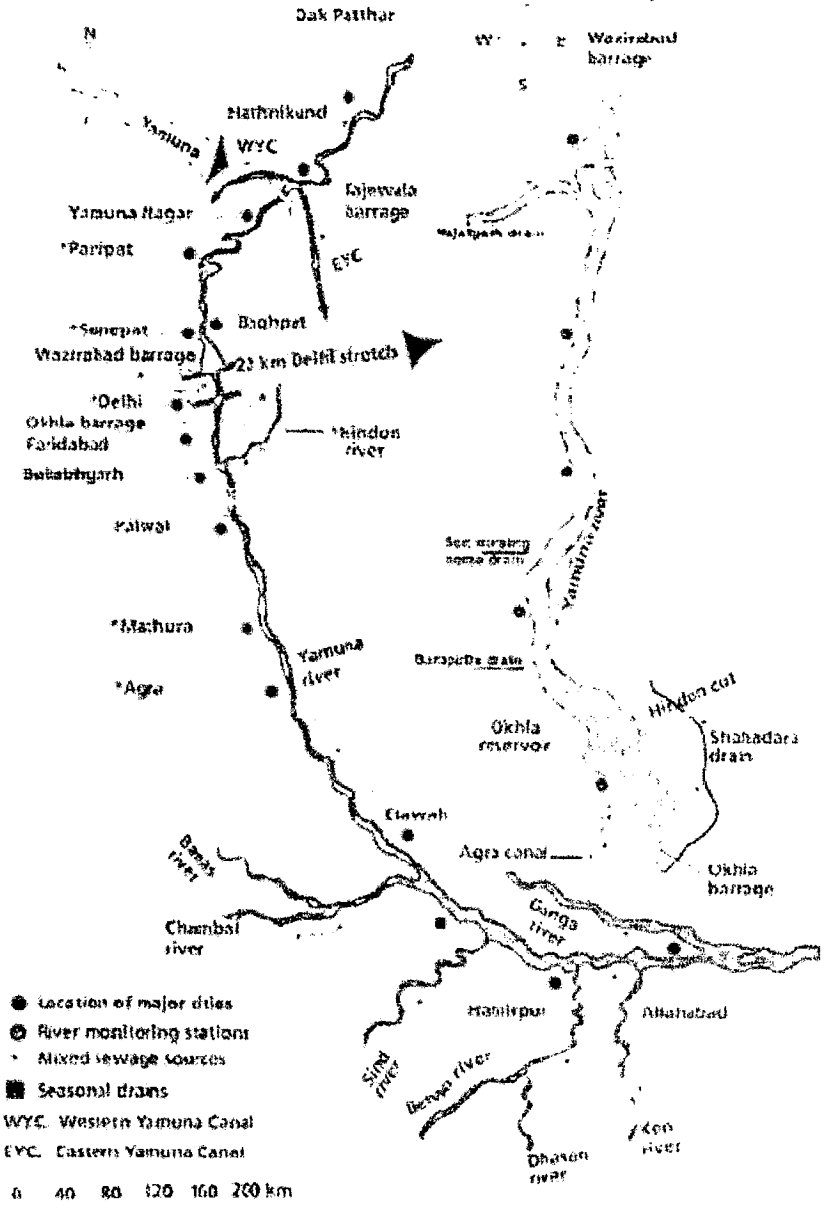


Fig.4.5.a):The course of River Yamuna
Source:website

4.5.2 PROFILE OF RIVER YAMUNA

1. Spread varies from (width): 1.5 km to 3 kms
2. Area of river bed (under active floodplain): 97 sq.km (9700 ha. appx.)
3. Area under water: 16.50 sq. km (1650 ha. GlOp.)
4. Area under dry land: 80.5 sq.km (8050 ha. app.)
5. Area under urban structures:20.00 sqkrn
6. Flood prone area(low lying area inundated by floods): 25 sq km
7. Agricultural land:35.5 sqkm
8. The main source of water in Delhi is Yamuna, 87% of the supply is met by the river alone while the rest 13% is taken from the ground water resources.
9. Quality of water: 'A' in the north of Wazirabad Barrage and 'E'(not even fit for animal consumption)in the south of the Barrage.
10. Apart from Yamuna, Delhi gets its water from the Ganga Canal, the western Yamuna canal, the Bhakra canal and the groundwater.
11. The river is tapped at Wazirabad through a barrage for drinking water supply to Delhi. Generally, no water is allowed to flow beyond Wazirabad barrage in dry season, as the available water is not adequate to fulfill the demand of water supply of Delhi.

4.5.3 LAND USE AND DEVELOPMENTS ALONG YAMUNA

As per the MPD2001 - the NCTof Delhi has been divided into 15 zones-8 in urban Delhi and rural areas (J to N and P) and one zone 0 (river Yamuna and riverbed area which falls under the land use category of Agricultural Land and Water Body).

Plate 4.5.a):The River Yamuna
Source:website

Development in and along the river Yamuna bed

Table 4.5.1: River stretch divided into 8 sub zones

Sub Zones	Reach	Approx.Area(in ha.)
01	NCTD Boundary To Wazirabad Barrage	3620.0
02	Wazirabad Barrage To 1SBT Bridge	1100.0
03	ISBT To Old Yamuna Cum Rail Bridge	225.0
04	Old Yamuna Bridge To ITO	800.0
05	ITO Barrage to Nizzamuddin Bridge	365.0
06	Nizzamuddin Bridge to NH-24	390.0
07	NH-24 To Okhla Barrage	1300.0
08	Okhla Barrage to NCTD Boundary	1900.0

[Source: Rejuvenation of Yamuna in NCT- a DDA report]

ZONE 01

ZONE		WEST	EAST
01	NCTD Boundary to Wazirabad Barrage	Agriculture	Agriculture, Water Works, Firing Range, Unauthorized Colony

This represents the vegetative cover and there has been an increase in the crop plantation. Deep and shallow water bodies account for 29% and 19% of the total area respectively.

ZONE 02

ZONE		WEST	EAST
02	Wazirabad Barrage to ISBT Bridge	Waterworks, Bathing Ghats	220 KV ESS ,grass farms, marshes

The total area under water bodies has decreased. There has been a substantial increase in the crop plantations and dense vegetation.Built up area has increased substantially due to rapid urbanization.

ZONE 03

ZONE		WEST	EAST
03	ISBT Bridge to Old Yamuna rail cum road bridge	Nigambodh Ghat ,unauthorised development	Unauthorized encroachment, agriculture

The water body has reduced due to increase in built up area and an increase in open land has also been observed.

ZONE 04

ZONE		WEST	EAST
04	Old Yamuna bridge to ITO	Red fort, electric crematorium, ShantiVan, Vijay Ghat, IG stadium, encroachments, Ghats, unauthorized colony	Unauthorized encroachment, agriculture

There has been an overall increase in the land under vegetative cover. But the total water body has decreased due to increase in encroachment in the river bed. Also there is an increase in the built up area especially on the right bank.

ZONE 05

ZONE		WEST	EAST
05	ITO Barrage to Nizzamuddin Barrage	IP power house, gas turbine power house, exhibition ground	Unauthorized encroachment, agriculture,forest

The area under crop plantation has decreased significantly. There has been a significant increase in open and fallow land. The major portion of the site includes unauthorized development that has sprung up over the agricultural land. Power house on the banks add to further pollution of the river.

ZONE 06

ZONE		WEST	EAST
06	Nizzamuddin Barrage to NH-24	Fly Ash Ponds, Fly ash Brick Plant, Unauthorized Encroachment	Unauthorized encroachment, agriculture,forest

ZONE 07

ZONE		WEST	EAST
07	NH-24 to Okhla Barrage	Electric Crematorium, Smriti Van, Okhla STP, Friends Colony, Unauthorized Encroachment	Unauthorized encroachment, agriculture

It mainly constitutes of agricultural lands This stretch also shows an increase in crop plantation and dense vegetation followed by decrease in area covered by the water bodies. The encroachment in the area has increased gradually from nil to about 60 ha.However *this stretch is one of the major reasons for water pollution of Yamuna as all the domestic wastes of residential*

areas are disposed off in Yamuna without any primary treatment by the Barapulla drain, Maharani Bagh drain and Drain Number 14.

ZONE 08

ZONE		WEST	EAST
08	Okhla Barrage to NCTD Boundary	Unauthorized Colonies, Agriculture, Madanpur Resettlement Scheme ,LPG Bottling Plant, Thermal Power Plant	Unauthorized encroachment, agriculture

The areas in this zone are more or less of agrarian nature. It is not very densely populated and being near the Delhi-UP border, is away from the major activities of the city. Madanpur Khadar is one of the few authorized colonies in this area. It is also the oldest settlement in that area. Its extension called the Madanpur Khadar Extension has been planned and has also been implemented to a large extent. This is also an authorized colony, but is a relatively new development.

The agricultural fields are largely placed towards the river and form large continuous open spaces. Also, there are large areas that are acting as dumping grounds for ash that result as a by-product of the Thermal Power plant on the zone.

4.5.4 POLLUTION IN THE RIVER

Pollution in the river Yamuna is mainly on three counts: first due to falling of the 17 large drains with high BOD resulting in the quality of water to be of 'E' category (even unfit for animal consumption), on account of unauthorized development taking place within the river area without infrastructure and thirdly due to large amount of fly ash being emitted by the 3 power plants located along the river Yamuna bed.

Plate 4.5.b):Pollution in the river
Source:website

Plate 4.5.c):Pollution in the river

The Yamuna's 22-km stretch in Delhi is barely 2 per cent of the length of the river, but contributes over 70 per cent of the pollution load. Delhi has spent over

15 billion rupees (£183 m.) on cleaning the Yamuna in the years to 2006.But in spite of this, pollution levels in the Yamuna have risen 2.5 times between 1980 and 2005. BOD (biochemical oxygen demand) load has increased 2.5 times between 1980 and 2005 - from 117 tonnes per day in 1980 to 276 tonnes in 2005.

The reasons are many: sewage has to be transported over long distances for treatment, through largely defunct conveyance systems. In 2001, only 15 per cent of Delhi's sewerage system was functional. Also,almost 45 per cent of Delhi lives in unauthorised colonies, generating 'illegal' sewage, which is unaccounted for.

On April 10, 2001, the Supreme Court directed that oxygen levels were to be maintained at a minimum concentration of 4 mg/l - but five years later, the river is still dead. In 2006, the Delhi government submitted another grand 40 billion rupee proposal under the Jawaharlal Nehru National Urban Renewal Mission.

Revival plan to be put up:

Centralised sewage treatment plants cannot be the only option - the cost of transporting waste to the treatment facility and transporting treated effluent back to the point of reuse makes them too expensive to run. Therefore, treatment facilities need to be constructed close to the source of sewage generation. Based on these principles, a detailed plan for the top six drains of the city, which contribute 90 per cent of the pollution in the river, should be made and implemented. Simultaneously, steps should also be taken to achieve dilution in the river - mainly by reducing the city's demand for freshwater. The river needs water for a minimum flow to keep it alive.Simultaneously an attempt needs to be made to revive the waterbodies and their catchment areas to store maximum run-off, which could then be used for local water needs or could be released into the river for dilution.

4.5.5 FLOODS

The flow of Yamuna within Delhi is by and large influenced by discharge from Tajewala Headwork 240 kms upstream. In the event of heavy rain in the catchment area excess water is released from Tajewala. Depending upon the river flow level down stream, it takes about 48 hours for Yamuna level in Delhi to rise. The rise in water level also causes backflow effect on the city's drains.

The city also experiences floods due to its network of its major drains having catchment areas extending beyond the city's limits.

4.5.6. ACTIONS TAKEN SO FAR

1. In 1974, the Water (Prevention and Control) Act was adopted by the Parliament to regulate discharge of effluents into the rivers and other water bodies.
2. Considering the importance of the project, especially with regards to the control of pollution, a high powered committee was formed in 1984.
3. In 1986, a comprehensive project report for the planning of the riverbed including channelisation of the river, also to check pollution and to improve environment on either side of the water stream was prepared. The project was handled by DDA in collaboration with MCD.
4. The National Water Policy (MOWR 1987) which emphasized the development, utilization, management and conservation of water resources, according to water use priorities with supply of drinking water at the top followed by irrigation, hydropower, navigation, industrial and other uses.
5. Taking into account the physical features of the river bed, Central Water and Power Research Station, Pune conducted studies in 1989. This was the basic report in which channelisation of the river was proposed.
6. In 1992,to arrest river pollution the government of India and the Ministry of Environment and Forests (MoEF) undertook an ambitious project "Yamuna Action Plan" in 12 towns of Haryana, 8 towns of Uttar Pradesh, and Delhi which is being implemented by the National River Conservation Directorate (NRCD) of the Ministry of Environment and Forests and the Japan Bank for International Cooperation (JBIC).
7. The major schemes under Yamuna Action include Sewerage Components like Interception and Diversion Works including Intermediate Pumping Stations and Sewage Treatment Plants (STP) and Non Sewerage Component like Low Cost Sanitation (LCS), Electric Crematoria, etc. All these works are being implemented by the Uttar Pradesh Jal Nigam (UPJN) in U.P, Haryana Public Health Engineering Department (HPHED) in Haryana, Delhi Jal Board (DJB) and Municipal Corporation of Delhi (MCD) in Delhi under the coordination of National River Conservation Directorate (NRCD).
8. The Central Government has lately approved the proposal of 'Yamuna Action Plan – Extended Phase' under the National River Conservation Plan with the estimated total cost about 222.60 crore .

Highlights of the Yamuna Action Plan-Extended phase:

1. To minimize the pollution of Yamuna significantly in Delhi.
2. Yield significant health benefits to the population of Delhi particularly those who live in re-settlement and rehabilitated colonies.
3. Relocation of nearly 75,000 III Clusters on river banks, rehabilitation of 38,440 jhuggis from Pusta, 9,600 from Barapura Nullah, 10,620 from Nazafgarh Drain, 581 from Shahdara drain and 3,000 from Sen Nursing Home.

Plate 4.5.d):Slums along the river
Source:website

Plate 4.5.e):Wildlife along the river

4. Development of green strips of 30 metres each on both banks. This would require development of banks up to 30 meters on each side.
   i) 10 metres would be green strips,
   ii) 10 metres would be covered by a long road
   iii) 10 metres would be taken up for developing a jogging track
5. Handing over total land to the Forest Department for plantation and development and management on the lines with the Ridge area.
6. The plan also involves developing of facilities for water sports alongside the banks and de-silting and deepening of the riverbed.
7. To enhance the aesthetics, proper illumination and electrification along the river would undertaken.
8. To ensure that all the 17 drains which are discharging partly treated and partly untreated waste water into the river are diverted. In the same way, the 38 tributary drains, Najafgarh drain, which are responsible for about 60 per cent of the pollution of Yamuna, will have to be tapped and diverted.Additional sewage treatment capacity is to be put in place with the decentralized approach. The emphasis will be on locating the new STPs as close to the river mouth as possible so that the use of conveying pipes is minimized.
9. The dilapidated trunk sewerage system to be rehabilitated and restored as early as possible so that the entire captured waste water is fully treated.

4.5.7 PROPOSED DEVELOPMENT OF THE YAMUNA RIVER BED- DDA

4.5.7a) The Proposals

1. The river front development plan was prepared by DDA in 2002. As per this plan, the river front was to be developed into a recreational space with promenades, parks, golf course, race course, nature trails, cycle tracks and so on. In short the 60 square kilometres of space on either side of the river from Wazirabad to Okhla (identified as O zone in the Master Plan) and 37 square kilometres of land upstream of Wazirabad could become the chill out zone of the Capital, if this plan was implemented.

   The river front development plan was drawn up on the basis of the recommendations made by the National Environmental Engineering Research Institute (NEERI), Nagpur.

   The report had divided the riverbed into three zones. Areas prone to flooding every 25 years or less are to be maintained as pondage area with water bodies to recharge ground water. Areas prone to flooding every 50 years can have recreational facilities while areas completely safe can have public and semi-public utilities like food courts, plazas and so on.

2. In May,2007, there is a proposal of developing an alternative approach to Yamuna river front ("Pushta", Phase-II) through a network of motorable roads, major pathways, "kuchcha pagdandies" and riverside walkways. This would ensure that the river-front would become accessible by cars even during the rainy season and during floods.

   In the areas safe from floods, the DDA would develop interpretation centre, aquarium, amphitheatre, food court and playing area for children among other things. In the flood prone areas, there would be camping sites, interactive orchard, theme garden, roadside urban greening, food courts, play area and picnic spots.

   The DDA also plans to set up sewage treatment plant to tap the open drain running alongside Shanti Van which flows into Yamuna.

   For the Phase-II of the Yamuna bio-diversity park, the Committee has approved development of 300 acres of floodplains close to the river front. This would consist of developing wetlands, grasslands, forest communities,

biodiversity village, corridor vegetation, game fishing, nature trails and peripheral plantations along with civic facilities. (*Source: The Hindu,May 24,2007)*

3. Delhi High Court has given the approval to the DDA to develop the 25-kilometre stretch, from Wazirabad to Okhla, of the river-bed on the lines of river Thames in London.*(Source: The Pioneer,New Delhi,January15,2007)*

4.5.7b) Guidelines for development

1. Regular dredging to check loss in carrying capacity due to long term silting.
2. Serious flooding on the river bed to be checked.
3. Topography to be maintained and development activities which require least amount of construction material to be allowed.
4. Areas for access and approach to the riverbed to have good quality of water, otherwise to be discouraged.
5. Permanent structures especially of residential or industrial nature not to be allowed.

4.5.7c) Issues related to proposed development

1. The Central Ground Water Board says that Yamuna floodplain is the only area in Delhi where water recharge takes place and the potential for recharge is high. If Delhi is to become self-dependent for its drinking water needs, then there is no option but to safeguard what remains of the flood plain. The Yamuna and its tributaries are composed of sand and silt deposited over millions of years, which give it the retention capacity equivalent to more than 50 per cent of its volume. Concretising the riverbed will kill its reservoir capacity.
2. Presently there are many major infrastructural projects going on the Yamuna river bed such as power houses, the indoor stadium, the Akshardham temple, Metro's main command centre and even the Delhi secretariat. Any kind of development which is permanent in nature can have adverse affect on the river and its bed.
3. Increase in constructional activities will obstruct the flow of the surface run-off within the area. This may further lead to water logging in Delhi. The development will also cause flooding in upstream areas of Haryana and downstream areas of U.P. along with a backflow in the 17 major drains falling in Yamuna leading to local flooding as well.

4. The floods of 1978 and 1998 had covered practically the entire area- which is now, proposed to be reclaimed. While strictly no active urban uses should be permitted in the area.
5. The entire Metro centre has been developed by dumping fly-ash onto the bed. Fly-ash is extremely dangerous when dumped near a water-source since heavy-metals and other pollutants soon find their way into the groundwater.
6. The location of the riverbed along a tectonic fault-line should have been taken into account when plans for projects like the Metro and DND flyover were drawn up since Delhi is in the high damage zone due to seismic activity. There are 24 epicenters of earthquake, with one being near Shakti Sthal. The rate of sedimentation in the river Yamuna suggests a neotectonic movement. The river brings silt along with it which keeps on depositing on its bed. If the course of the river is narrowed, the silt will get deposited in less area and exert on the fault lines. Moreover building activities, traffic, inhabitation on the river bed will also exert an ever-increasing pressure on fault lines which will result in earthquakes.

4.5.8 CONCLUSION

The river is the only open space that is available in the heart of the city. In fact, today it is the area centrally located between the two cities of Delhi i.e. one existing on the western bank and the other on the eastern bank. Therefore, it is felt that this area should be treated as a precious conservation belt.The floodplains of the river should be developed as a major recreational resource and open space for the metropolis of the future, with emphasis on retaining the character of the city by curbing the growth of industry and trade.

4.6 THE HOOGLY RIVERFRONT, KOLKATA

REASONS FOR SELECTION:

1. The development has been proposed by Govt. organisation, Calcutta Metropolitan Development Authority.
2. It calls for putting a check on the pollution in the river.
3. It deals with the beautification of the Hoogly riverfront.
4. It deals with the restoration of the ghats and warehouses.
5. The river Hoogly will be used more for transportation.

STRENGTH OF THE CASE STUDY:

1. The riverfront plan will enhance tourism on the Kolkata and Howrah waterfront.
2. Increased transportation facilities as Hoogly river will also be used for transportation.
3. New creative and commercial uses for the warehouses would generate employment for local people.

SUCCESS OF THE SCHEME:

The scheme is under implementation. So far, the state government has been able to implement only one of the 45 proposals by setting up the **Millennium Park** on Strand Road.The park receives around 1.25 million people annually and has been a great success.

4.6.1 INTRODUCTION

"For an eternity, Calcutta has turned its back on the river, and paid a heavy price for the apathy" Charles Correa.

Charles Corea has one enduring dream: to create something on the waterfront that would bring the river back into the consciousness of the city. Not an out-and-out commercial venture, but a platform to enable the public to participate in the river, to bask in its beauty and serenity and be energised.

The dream taking shape, with the thrust towards a master plan for integrated development involving all stakeholders gaining momentum.

Plate 4.6a):Steps are being taken to ensure an uninterrupted vista along the riverfront
Source: website

4.6.2 THE DETAILS OF THE PROJECT

The important points for the development are:

1. As former chairman of the National Commission of Urbanisation, Correa had studied all major state capitals and always felt the true potential of Calcutta's river was never realised.

2. Correa had stressed the need for an extremely sensitive and holistic solution respecting the sacred character of the Hooghly and what it meant to the citizens of Calcutta.
3. All agencies have agreed in principle to one masterplan, with the core area stretching from Chinsurah to Budge Budge.Ensuring an unimpeded view of the river is among the key issues.
4. The stretch is unique since it had housed trade hubs of five European majors the Dutch, the Danes, the French, the Portuguese and the British.
5. The goal is to de-weed the trade and commerce association and bring rich cultural fabric to the river.
6. There are too many display boards, besides banks of tall perimeter walls of the Calcutta Port Trust (CPT) guarding the view of the river. The agencies concerned will reduce the visual clutter and open up the vista.
7. The agencies involved are the Port Trust ,the railways, Calcutta Municipal Corporation (CMC) ,the Calcutta Metropolitan Development Authority (CMDA), the Inland Waterways Authority of India, West Bengal Tourism and INTACH, police and the environment department.
8. A proposal is also there to clear the stretch opposite Howrah station where temporary stalls, hawking foodstuff and other items have completely blocked the view of the river.
9. To undertake a joint inspection of Burrabazar station of the Circular Railway by all the agencies to decide on the type and extent of restoration to ensure harmony with the overall project.
10. CPT officials have plans to develop their land banks along the river into parks, aqua-parks, health clubs and naturopathy centres, besides restoration of the ***ghats*** and warehouses.
11. The magnificent nineteenth-century red-brick warehouses of Marseilles, renovated and reused, and the revamped old Kuching waterfront in Sarawak, Malaysia, are among those projected as replicable models.
12. A tentative distance of 500 metres from the riverbank will be considered as core area and another 500 metres on either side as fringe area in the master plan. Land-use guidelines for these corridors will be framed to ensure envelope control.
13. A single authority will be put up with development control over both the east and west banks of the river so that it can design and implement the intentions of the master plan. It can function as an urban arts commission, which will control the aesthetic and environmental qualities of the development on both sides of the riverbank, somewhat like the Pennsylvania Avenue Development Authority in Washington DC.

14. The West Bengal government organised a workshop in December 2002 jointly with the London Rivers Association and the English Heritage in Kolkata to formulate a master plan for beautification of the Hooghly riverfront.
15. The London Rivers Association had earlier prescribed a set of 45 proposals for the beautification of the riverfront along the Hooghly after the West Bengal government sought British help to preserve and dress up the Hooghly river banks on the lines of the river Thames beautification project.
16. The other recommendations of the LRA were :
    a)Using the river Hooghly more for transportation.
    b)Formulation of a tourism strategy for Kolkata and Howrah waterfront.
    c)Ferry service between Shalimar railway station and Babughat.
    d)Relocation of bus stand on Strand Road and restriction on truck movements at night and improved ferry terminals.

17. So far, the state government has been able to implement only one of the 45 proposals by setting up the **Millennium Park** on Strand Road.

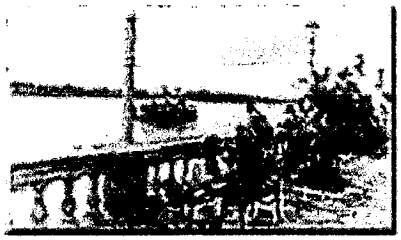


Plate 4.6.b):The Millenium park
Source: website

18. Now 300 metres belonging to the Calcutta Port Trust has been handed over to the Calcutta Metropolitan Development Authority for development and beautification as an extension of the Millennium Park. The stretch will be marked a heritage zone.
19. The London Rivers Association has offered its expertise based on extensive knowledge of the regeneration of the London Docklands and other port cities .
20. The Strand Road warehouse is being restored.
21. The report carefully considers how the intense flows of traffic and pedestrians in the area could be radically improved as part of the area's regeneration. And how new creative and commercial uses for the warehouses would generate employment for local people.
22. The riverfront development project has been drawing many visitors in Kolkata.

4.6.3 THE MILLENNIUM PARK:

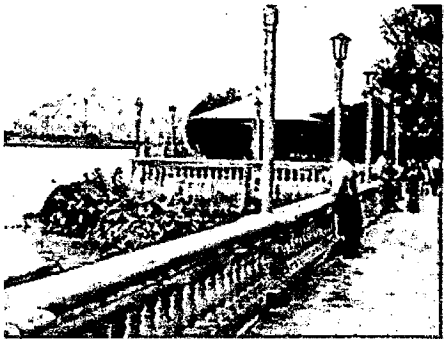


Plate 4.6.c):View of Hoogly River Bridge from Millenium Park
Source:website

The Millennium Park runs along Strand Road, for a kilometre on the eastern bank of the Hooghly river has been a successful attempt.It has come up at the site of the old abandoned Calcutta Port Trust warehouses.

Two sections of the park, stretching over 750 m, were opened to the public on January 1, 2000, while the final section, 300 m in length, was made accessible on January 1, 2006. While people seem satisfied with the initiative, some scepticism prevails over the quality of river water. The recreational area has not been reclaimed, only redecorated. Therefore, unlike most riverfront developments, this has not affected the river's hydrology.

Plate 4.6.d): The landscaping at Millenium Park

Lily pools, herbal and cosmetic gardens, food kiosks, an amphitheatre, a promenade, amusement rides and a children's park adorn the park. An added attraction is access to the Silver Jet Jetty and Fairlie Jetty for those who fancy a boat ride. In addition, KMDA organises festivals, with musicians and actors performing at the amphitheatre.The park receives around 1.25 million people annually.

Originally the park was maintained by KMDA. However, in 2001 it hired

S B Ex-Servicemen's and Youth Security Guards Welfare Association on contract. In addition to miscellaneous revenues, KMDA earns a fixed share of Rs 30.5 lakh per annum of which it spends approximately Rs 20 lakh on overheads.

4.6.4 POLLUTION RISING

The flip side of this success is the state of the Hooghly. While dissolved oxygen levels, measured in July 2007 by the National River Conservation Directorate, remain suitable for bathing at all monitoring stations (>4 mg/l), the total coliform count, according to the state pollution control board's annual reports, 2001-06, has been rising. While the average levels in 2001-02 were mostly within levels suitable for bathing (500 most probable number/100 ml), the 2005-06 average escalated to 423,125 MPN/100ml at the Howrah monitoring station. This is the closest sampling point to the millennium park.

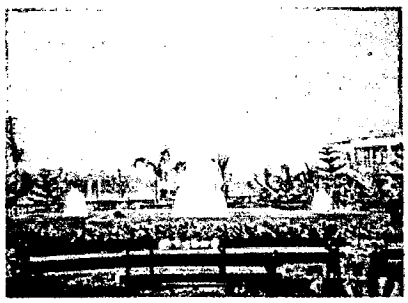


Plate 4.6.e): The landscaping at Millenium Park
Source:website

The Ganga Action Plan-I did not tackle the problem .This has been incorporated in the second phase, however. Twenty-five sewage treatment plants (STPs) have been installed in West Bengal under phase-II to maintain water quality. There are two outside the Kolkata municipality, receiving waste from the city. But both the Bangur and Garden Reach STPs are underutilised due to a lack of household connections in their catchments. According to a 2006 Asian Development Bank document, only 17 per cent of the population in these areas has sewer connections.

Saving grace

There are nine stormwater outfalls controlled by gates discharging into the river from the Kolkata Municipal Council area during the monsoon. These are opened during low tide.But as in most cities, these outlets for rainwater now carry sewage and could impact water quality. One of the outfalls is located between the Silver Jet Jetty and Fairlie Jetty stretch of the park.

But sewage is not a problem, since the Hooghly is not a natural drainage outlet for the city area—its banks being higher than the drainage basin. The city slopes from west to east, away from the Hooghly. The river has another hydrological feature, which, according to experts, keeps pollution levels in check. The effects of the outfalls are reduced due to the Hooghly tidal bore, through which the incoming tide of water travels up the

river against the direction of the current. The volume of water dilutes the dirt.

(Source:Article by Bharat lal Seth in Science & Environment online, Down to Earth magazine,Nov.4,2007)

4.7 INFERENCES

From the study of various riverfronts of India, it can be derived that the Govt. has started taking initiative towards the riverfront development in various cities and the value of rivers in the life of the people is being increasingly recognized. The Sabarmati Riverfront is an example of the effort being successfully made to make the river alive again. The ghats of Haridwar and Banaras depict the religious riverfronts and the Yamuna and Kolkata riverfront are the recreational riverfronts. More participation is needed on the part of the people also for the revival of our rivers.

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The sources of photographs taken from websites are as below:

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The source of photographs taken by author are through primary survey conducted by the author in Oct.-Nov.2007.

CHAPTER 5
ALLAHABAD: CITY PROFILE

5.1 INTRODUCTION

This chapter deals with the profile of the city of Allahabad. It will give an overview of the city's historical background, its physical aspects, demographic profile, landuse structure and the infrastructure available in the city.

Allahabad is a city in the north Indian state of Uttar pradesh. It is located at 25°28'N & 81°50'E. Its area is 216.89km² (proposed in master plan 2001 of which only 94.18 sq.km. was developed upto 2002).
The population of this city was 12 lakhs(in 2001).

Fig. 5.a): Map showing Dist. Allahabad
Source: website

5.2 HISTORICAL BACKGROUND:

The modern city is on the site of the ancient holy city of **Prayag** for "place of sacrifice".The name was given to the city by the Mughal Emperor Akbar in 1583. The "allah" in the name does not come from allah as God's name in islam but from the **din-ilahi**, which was the religion founded by Akbar.

It has a position of importance in the Hindu religion and mythology since it is situated at the confluence of the holy rivers Ganga and Yamuna, and Hindu belief says that the invisible Sarasvati

River joins here also.This is named as 'Sangam' of three rivers. It is also one of four sites of the Kumbha Mela, the others being Haridwar, Ujjain and Nasik.

In 1801, the British annexed the city and its fort, establishing colonial rule for the next 150 years.After the first war of independence the town was named "ALLAHABAD" and was made the capital of United Province of Agra and Oudh.

In 1868 AD it became a seat of Justice when Allahabad High Court was established. From the days of civilization Allahabad has been a seat of learning, wisdom and writing. It is one of the most vibrant politically and spiritually awakened city of India.

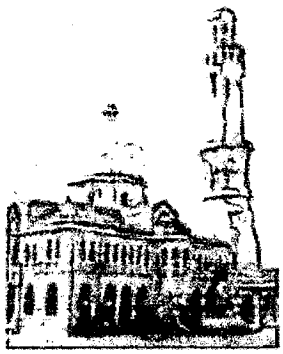

Plate 5.a): Allahabad University
Source: website

Plate 5.b): Akbar's fort at Sangam

5.3 TOPOGRAPHY

An important part of the Ganga-Yamuna Doab region, it is the last point of the Yamuna river and is the last frontier of the Indian west. The land of the Allahabad district that falls between the Ganga and Yamuna is just like the rest of Doab - fertile but not too moist, which is especially suitable for the cultivation of wheat. The non-doabi parts of the district i.e. the southern and eastern part of the district are somewhat similar to those of adjoining Bundelkhand and Baghelkhand regions, i.e. dry and rocky.

5.4 CLIMATE

The climate of Allahabad district is characterised by a long and hot summer, a fairly pleasant monsoon and cold seasons. The winter usually extends from mid-November to February and is followed by the summer which continues till about the middle of June. The south-west monsoon then ushers in the rainy season which lasts till the end of September. October and the first half of November constitutes the post-monsoon season.

5.4.1 Rainfall

About 88 percent of the annual rainfall is received during the monsoon season. July and August being the months of maximum rainfall. The normal rainfall in the district is 975.4 mm. (38.40") but the variation from year to year is appreciable. On an average there are about 48 rainy days in a year, the variation in different parts of the district being negligible.

5.4.2 Temperature

From about the middle of November, the temperatures begin to fall rapidly and in January (the coldest month) the mean daily maximum is 23.7°C (74.7°F). Temperatures rise rapidly after February. The heat in the summer season-particularly in May and the early part of June is intense. May usually being the hottest month of the year with the mean daily maximum temperature at 41.8°C (107.2°F) and the mean daily minimum at 26.8°C (80.2°F).

5.5 DEMOGRAPHIC PROFILE OF ALLAHABAD

5.5.1 Population

The population of Allahabad city was 12 lakhs in 2001.In the main city area, it was 9 lakhs, in Naini area 1.6 lakhs, in Phaphamau 80,000 and in Jhusi area 60,000. The decadal increase of population from 1991 to 2001 has been 42.08%.The population is projected to be 16.4 lakhs in 2011 and 20.5 lakhs in 2021.

Table 5.1: Population of Allahabad city

S.NO.	REGION	YEAR 1991	YEAR 2001
A.	MAIN CITY AREA	**761755**	9,00,000
1.	NAGAR NIGAM AREA	717777	
2.	SUBEDARGANJ RLY. COLONY	3606	
3.	DRIRVANI NAGAR	2312	
4.	CANTONMENT	38060	
B.	NAINI AREA	**57906**	1,60,000
1.	NAGAR NIGAM AREA	50196	

2.	TRIVENI AREA	4125	
3.	A.D.A. COLONY	1155	
4.	I.T.I. FACTORY & COLONY	872	
5.	INDIA PUMP & COMPRESSIONER FACTORY	631	
6.	T.S.L. FACTORY	466	
7.	MUKTA BIHAR COLONY	461	
C.	PHAPHAMAU AREA	**24885**	80,000
1.	NAGAR NIGAM AREA	24885	
D.	JHUSI AREA		60,000
1.	NAGAR PANCHAYAT	EXCLUDED	
	TOTAL	844546	12,00,000

Source: Master plan 2021 of Allahabad

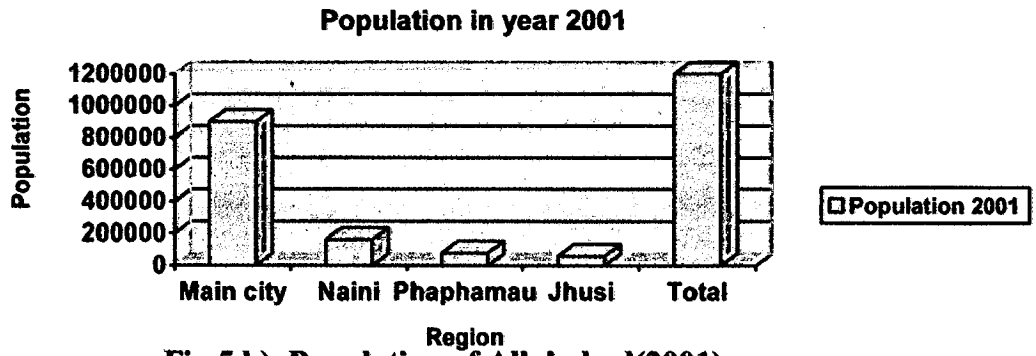

Fig.5.b) Population of Allahabad(2001)

Source: Master plan 2021 of Allahabad

Table 5.2:Allahabad city population & decadal increase

S.NO.	YEAR	POPULATION	PERCENTAGE
1.	1951	3,32,295	-
2.	1961	4,30,730	+ 29.62
3.	1971	5,13,036	+19.11
4.	1981	6,50,070	+26.71
5.	1991	8,44,546	+29.92
6.	2001	12,00,000	+42.08

Source: Master plan 2021 of Allahabad

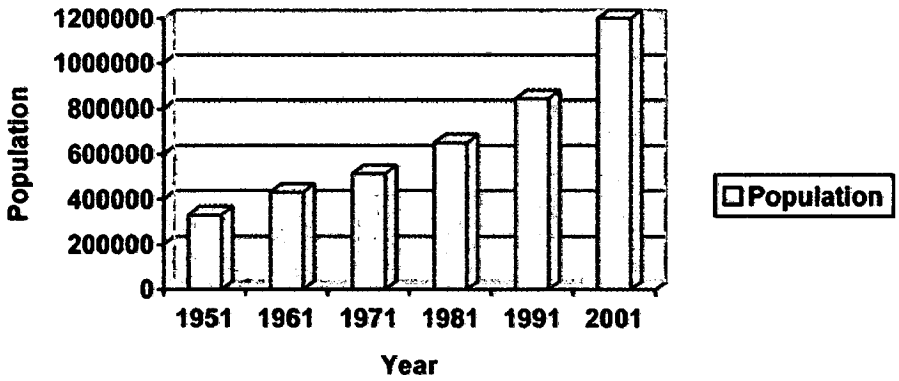

Fig.5.c) Decadal Increase in population

Source: Master plan 2021 of Allahabad

Table 5.3 : Projected Population of Allahabad city

S.NO.	PROJECTION METHOD	POPULATION YEAR		
		2001	2011	2021
1.	PARABOLIC	1323771	1713127	2175949
2.	ARITHMETIC	1250305	1493029	1735753
3.	GEOMETRIC	1310943	1705733	2219502
4.	TOTAL	1294973	1637296	2043735
5.	INCREASE	28.52%	26.43%	24.82%

Source: Master plan 2021 of Allahabad

5.5.2 Sex Ratio

In 2001,there were 811 females on 1000 males as compared to 862 females on 1000 males for Uttar Pradesh.This shows that it is very less than the ratio of Uttar Pradesh.

Table 5.4: Sex ratio of Allahabad city and Uttarpradesh

S.NO.	REGION	FEMALES PER 1000 MALES			
		1971	1981	1991	2001
1.	ALLAHABAD CITY	784	811	811	811
2.	UTTAR PRADESH REGION	821	846	862	862

Source: Master plan 2021 of Allahabad

5.6 ECONOMIC STRUCTURE

The base of the economic structure of the city are the tertiary activities mainly including trade and commerce and other services. The tertiary activities constitute 67% of the total occupied population. In spite of the establishment of Naini industrial area, secondary sector has not become the prime occupation of this city. The percentage of population occupied is 27% in 2001 and is projected to increase to 29.27% in 2021.In 2001,among the five big cities of Uttar Pradesh, the occupational percentage of Allahabad is the least i.e.27%. So the city has not economically progressed so much as those of Kanpur and Varanasi.

Table 5.5: Occupational Structure

S.NO.	OCCUPATION	2001		2021	
		NO.	%	NO.	%
1.	PRIMARY	9720	3.0	18000	3.00
2.	SECONDARY	97200	30.0	180000	30.00
A.	HOUSEHOLD	24300	7.5	42000	7.00
B	OTHERS	61560	19.0	117000	19.50
C	BUILDING ACTIVITIES	11340	3.5	21000	3.50
3.	TERTIARY	217080	67.0	402000	67.00
A.	TRADE & COMMERCE	87480	27.0	168000	28.00
B.	TRAFFIC & TRANSPORT	40500	12.5	87000	14.50
C.	OTHER SERVICES	89100	27.5	147000	24.50
	TOTAL	324000	100.00	6,00000	100.00
	%	27.00%		29.27%	

Source: Master plan 2021 of Allahabad

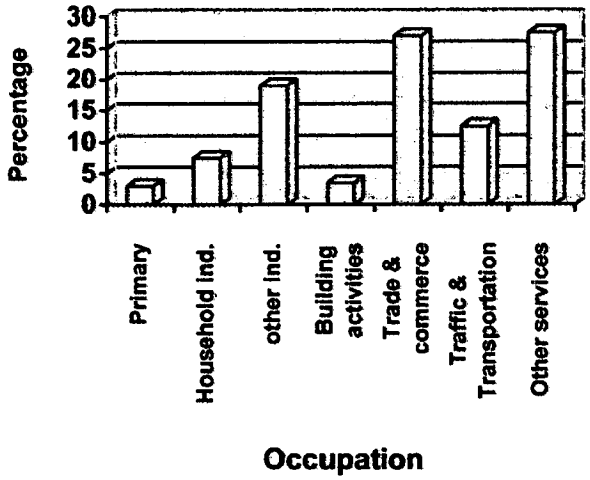

Fig.5.d) Occupational structure(Year 2001)
Source: Master plan 2021 of Allahabad

5.7 LAND-USE

In Master Plan 2001, 21689.53 hectares of land had been proposed for development. For 2021, 30917.38 hectares of land has been proposed. The residential sector constitutes 36.11%, Commercial sector 2.41%, industrial sector 5.57%, Institutional 8.49%, recreational 16.02%, Public & Semi-public facilities 3.82%, Public utilities 2.23%, traffic & transportation 12.09% and other landuses 13.26%.

Table 5.6: Existing & Proposed Land-use:Master Plan 2021

	LANDUSE	PROPOSED LAND-USE IN MASTERPLAN 2001 (Areas in Hectares)	PRESENT LAND-USE IN MASTERPLAN 2002 (Areas in Hectares)	PROPOSED LAND-USE IN MASTERPLAN 2021 (Areas in Hectares)	PROPOSED LAND-USE IN MASTERPLAN 2021(%)
1	2	3	4	5	6
1.	**RESIDENTIAL**	**7622.24**	**5831.46**	**11164.48**	**36.11**
a.	Low density	-	-	5364.22	17.35
b	Medium density	-	-	5273.86	17.06
c	High density	-	-	526.40	1.70
2	**COMMERCIAL**	**545.43**	**393.68**	**746.20**	**2.41**

a	General commercial	-	-	331.00	1.07
b	Wholesale	-	-	126.00	0.40
c	City/district centre	-	-	169.00	0.55
d	Godowns	-	-	120.20	0.39
3.	**INDUSTRIAL**	**1217.81**	**482.80**	**1722.89**	**5.57**
a.	Heavy industry	-	-	1045.00	3.38
b	Medium industry	-	-	166.00	0.54
c	Small-scale industry	-	-	511.89	1.65
4.	**INSTITUTIONAL**	**1871.09**	**315.44**	**2624.50**	**8.49**
a	Offices	-	-	278.50	0.90
b	Undefined	-	-	2346.00	7.59
5.	**RECREATIONAL**	**2531.48**	**159.14**	**4953.45**	**16.02**
a	Park/open areas	-	-	351.75	1.14
b	District Park	-	-	402.20	1.30
c	Regional Park	-	-	1719.00	5.56
d	Playground/Stadium	-	-	112.00	0.36
e	Kumbh Mela area			707.00	2.29
f	River bank development	-	-	1433.00	4.63
	Cultural & religious places	-	-	228.50	0.74
6. PUBLIC & SEMI-PUBLIC		**571.24**	**607.84**	**1179.78**	**3.82**
A	**Educational**	-	-	**1018.72**	**3.30**
a	Universities	-	-	191.00	0.62
b	Colleges	-	-	104.00	0.34
c	Technical institutions	-	-	723.72	2.34
B	**Health**	-	-	**161.06**	**0.52**
a	General hospital	-	-	134.16	0.43
b	Speciality hospital	-	-	6.40	0.02

c	Medical college	-	-	20.50	0.07
7	**PUBLIC UTILITIES**	**1660.53**	**39.37**	**690.05**	**2.23**
a	Waterworks	-	-	17.25	0.05
b	Electricity	-	-	43.12	0.14
c	Sewage farm	-	-	629.68	2.04
8	**TRAFFIC & TRANSPORTATION**	**2434.80**	**1588.76**	**3736.30**	**12.09**
a	Present/proposed roads	-	-	2840.50	9.19
b	Bus terminal	-	-	57.80	0.19
c	Truck terminal	-	-	107.00	0.35
d	Railway	-	-	623.00	2.01
e	Water transport terminal	-	-	48.00	0.16
f	Airport	-	-	60.00	0.19
9	**OTHER LANDUSE**	**3234.51**	-	**4099.73**	**13.26**
a	Cemetry	-	-	52.54	0.17
b	Vegetable Belt	-	-	250.00	0.81
c	Forest	-	-	1594.00	5.16
d		-	-	1640.00	5.30
e	Pasture land/Dairyfarm	-	-	563.19	1.82
	TOTAL	**21689.53**	**9418.49**	**30917.38**	**100.00**

Source: Master plan 2021 of Allahabad

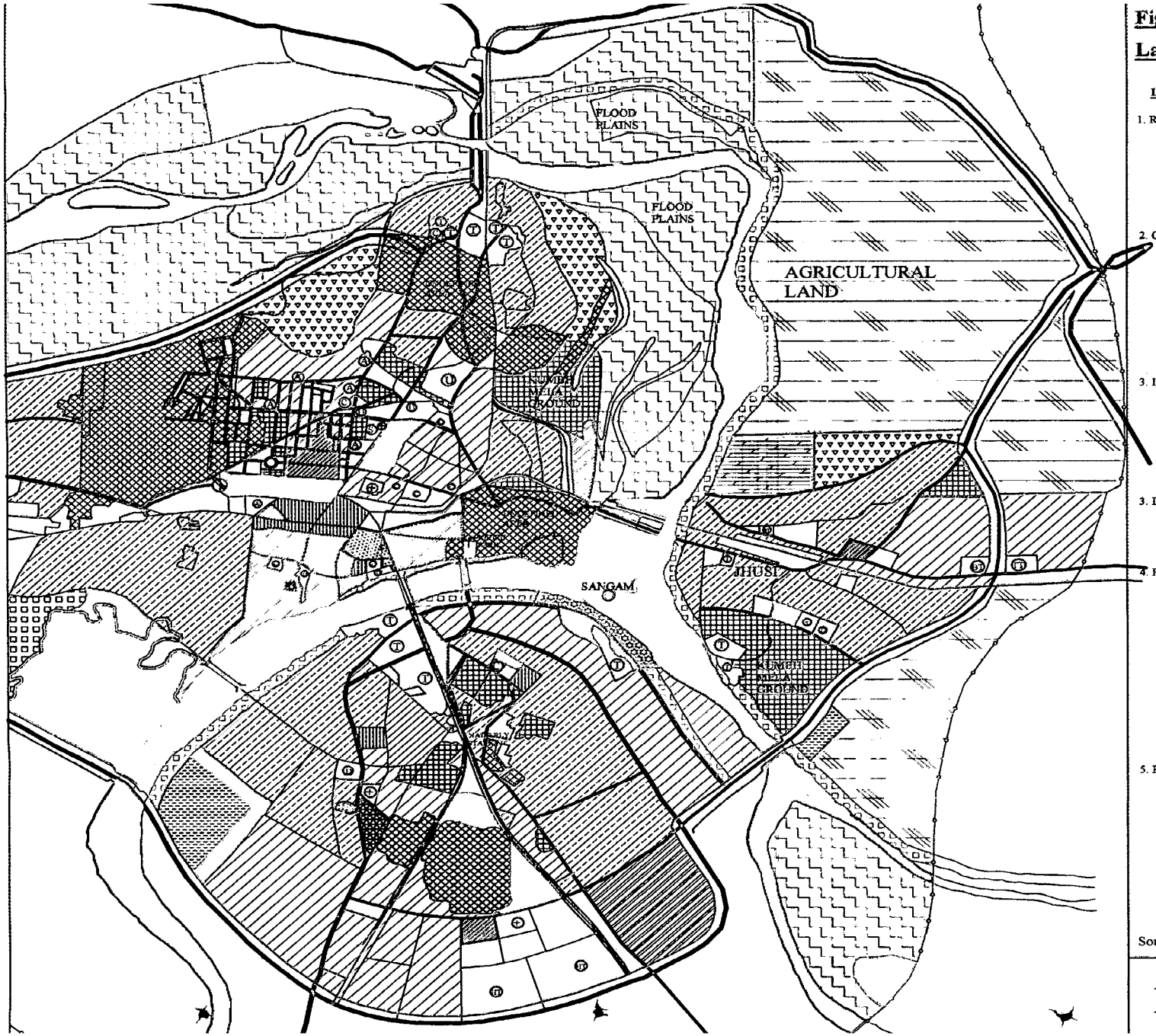

Fig.5.e) ALLAHABAD MASTERPLAN 2021

Landuse Map

LEGEND

1. RESIDENTIAL
   - HIGH DENSITY (501-600)
   - MEDIUM DENSITY (251-500)
   - LOW DENSITY (UPTO 250)
   - VILLAGE POPULATION
2. COMMERCIAL
   - DISTRICT CENTRE
   - GENERAL COMMERCIAL
   - WHOLESALE
   - GODOWNS
   - BAZAR STREET
3. INDUSTRIAL
   - HEAVY INDUSTRY
   - MEDIUM SCALE INDUSTRY
   - SMALL SCALE INDUSTRY
   - COTTAGE INDUSTRY
3. INSTITUTIONAL
   - OFFICES
   - UNDEFINED AREA
4. RECREATIONAL
   - PARK/OTHER OPEN SPACES
   - DISTRICT PARK
   - REGIONAL PARK
   - PLAYGROUND/ STADIUM
   - KUMBH MELA
   - RIVER FRONT DEVELOPMENT
   - CULTURAL & RELIGIOUS DEV.
5. PUBLIC & SEMI-PUBLIC SERVICES
   - SCHOOL/INTER COLLEGE
   - DEGREE COLLEGE
   - UNIVERSITY
   - TECHNICAL
   - HI-TECH
6. HEALTH
   - GENERAL HOSPITAL
   - SPECIALITY HOSPITAL
   - MEDICAL COLLEGE
7. PUBLIC UTILITIES
   - WATERWORKS
   - ELECTRICITY
   - SEWAGE FARM
8. TRAFFIC & TRANSPORTATION
   - RAILWAY AREA/RLY. LINE
   - BUS TERMINUS
   - TRUCK TERMINUS
   - WATER TERMINUS
   - AIRPORT
   - PRESENT FLYOVER
   - PROPOSED FLYOVER
   - PRESENT ROAD
   - PROPOSED ROAD
   - PRESENT BRIDGE
   - PROPOSED BRIDGE
9. OTHERS
   - PROPOSED BRIDGE
   - FLOOD PLAINS
   - VEGETABLE BELT
   - FOREST BELT
   - PASTURES & DAIRY FARM
   - AGRICULTURAL BELT

N

Source: Allahabad Master plan 2021 report

5.8 INFRASTRUCTURE

5.8.1 Water Supply

At present, 55% water supply of the city is being fulfilled by the ground water and only 45% is served by the surface water source even when surface water is abundant. Excessive use of groundwater should be checked which shall otherwise lead to depletion of underground water table.

Existing issues:

1. Water supply level is poor and irregular.
2. Water supply system is insufficient and inadequate.
3. Deficient pipeline distribution network of supply.
4. Condition of existing water treatment plant is poor.
5. Fall in the water level of Yamuna during summer putting adverse effect on tubewells.
6. Inadequate water supply during kumbh mela.

From a geographical point of view, the selected sites of intake at Karelabagh and of its distributing station at Khusroobagh were the most suitable. Karelabagh is the western most point of the city along the Yamuna, where the river flows by its steep bank and is sufficiently deep. Water is available here all the year round. Khusroobagh is one of the highest parts of the city nearer to Karelabagh, and the intake and distribution of water from this place are easier. But the plan lacked foresight in that it did not consider the requirement of a growing city, for which wider space for filters, processing and other necessities should have been reserved. Thus the present site of Allahabad Water Works has now become unsuitable .

Table 5.7: No. of watersupply zones and tubewells in the city

No. of Water supply zones out of which Jhusi is out of water works	12
No. of tubewells	72

Source: Water works department, Allahabad

The following table gives the total municipal water production. It shows that the water production from tube wells is 137 mld which is more than that produced from Yamuna river i.e. 80mld.

Table 5.8: Total municipal water production

Source	Production capacity(mld)
Yamuna river	80
Tube well	137
Total	217
Population served	10,49,831 (in 2003)
Production capacity per capita	207 lpcd
Less leakage loss estimated at 15%	180 lpcd

Source : NRCD(National River Conservation Department) report

Table 5.9 : Waste water generation rate

	2003	2015	2030
Per capita water consumption (lpcd)	295	254	221
Return factor	0.70	0.70	0.70
Per capita waste water discharge(lpcd)	206 say 205	172 say 175	155

Source : NRCD(National River Conservation Department) report

5.8.2 Sewerage and Sanitation

The existing sewerage system consists of two main sewers i.e. Lowther road and G.T. road sewers. Other intercepting sewers and laterals serving the thickly populated areas of the city join them at appropriate places. All these sewers converge into a central pump situated inside the Gaughat Pumping Station, from where the sewage is pumped across the Yamuna Bridge to Naini sewage farm run by the Municipal Corporation, Allahabad.

The existing sewerage system is not only inadequate but actually a disgrace to the holy city of Prayag. The existing issues are:

1. There are no sewer lines in 70% the areas. Even in those areas where

the sewers exist, the branch sewers are absent with the result that a large amount of sullage and sewage is being carried through either drains in the mohallas or through the municipal storm water drains.

2. The crude sewage through these nalas is discharged into river Ganga, specially in Daraganj and other places where it is menace to the health of the whole community using the sacred water of Triveni for bath and other purposes.
3. There are a total of 13 open drains in the city which drain off the sewage into Ganga & Yamuna causing increase in the pollution of the river.
4. As far as Fringe Areas are concerned no major attempt has been made to lay sewer lines. 90% of the total Fringe areas do not have the sewer system. Most of the colonies developed by ADA in the fringe areas consist of sewer lines but other areas around these new developments including unauthorised constructions and villages left unprovided with the sewerlines.
5. Sewerage and rain water are mixed.
6. Only 20% of sewage is treated.

5.8.3 Storm water drainage

A separate and proper drainage network is required to be planned for the entire city to drain off the storm water, so that water logging happening in different parts of the city (Allahpur, the most) is avoided. This shall also prevent quantity and quality of sewage water from being affected from storm water and treated effectively.

Existing issues

1. Only half of the city is covered by drainage facility.
2. Due to combined system, substantial quantity of silt and debris is drained into the sewer system.
3. Blockage of drains in most parts of the city.

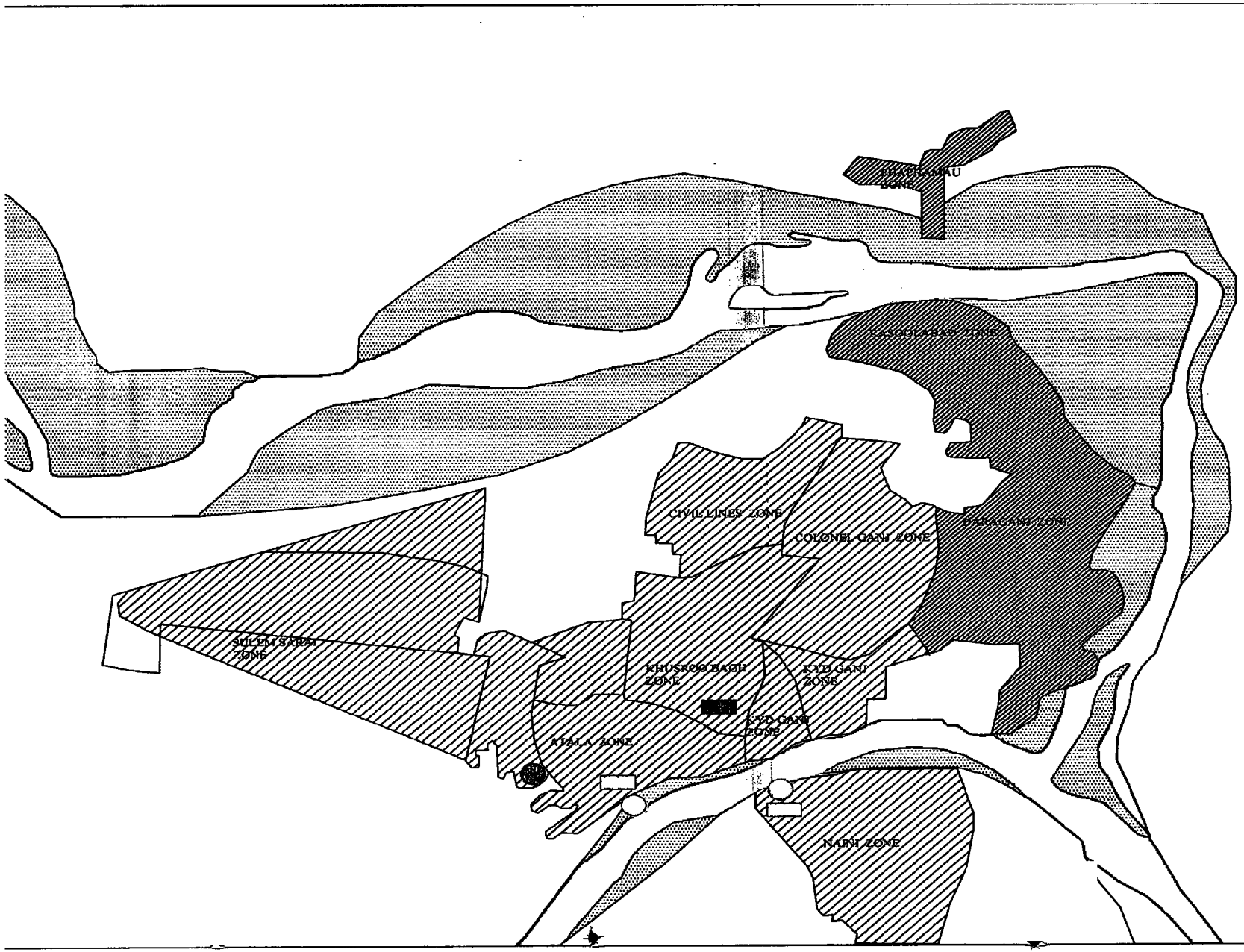

Fig.5.f) PROPOSED WATER SUPPLY ZONES AT ALLAHABAD

LEGEND

- MUNICIPAL BOUNDARY
- WATER SUPPLY ZONES
- RIVER BED
- RIVER CHANNEL
- TUBE WELL ZONE
- RIVER ZONE
- PROPOSED RIVER WATER ZONE
- EXISTING INTAKE WORKS
- EXISTING WATER WORKS
- PROPOSED INTAKE WORKS
- PROPOSED WATER WORKS

N

Source:City development plan,Allahabad

5.9 INFERENCES

The city is lagging behind in the basic infrastructure facilities like water supply, sewerage and drainage. Areas like Allahpur, Daraganj, Jhusi are the major areas of concern. Also, the city has not developed its economic structure so well. Such developments should take place which will strengthen the economic base of the city. The city also needs to be developed more in its socio-economic aspects. Efforts need to be taken for the future growth of the city.

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5. Promod Singh,(1989),Urban environment conservation, Ashish publication, New Delhi
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7. Allahabad Development Authority, Allahabad Master Plan 2021 Report
8. Town and Country Planning Dept. U.P., Allahabad Master Plan 2021 Report

Source of photographs from the websites are as below:

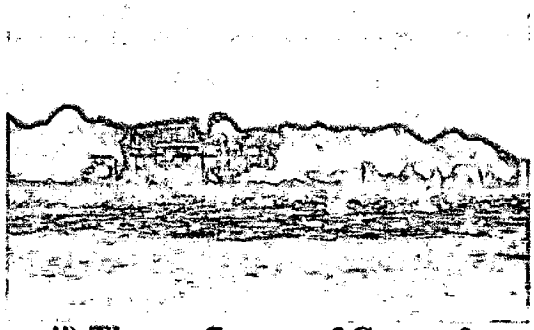
1. en.wikipedia.org/wiki/Allahabad
2. http://www.sacred-destinations.com/india/allahabad.htm

CHAPTER 6
THE RIVERFRONT OF ALLAHABAD: STUDY AREA

6.1 INTRODUCTION

The chapter discusses the profile of the riverfront of Allahabad. The extent of the study area has been decided and the various landuses existing in that zone have been surveyed. Also the various problems and issues relating to the area have been explored. The riverfront has a great religious importance and is a major tourist destination.

i) Google Earth image of the confluence of two rivers



ii) The confluence of Ganga & Yamuna

Plate 6.a)
Source:website

6.2 EXTENT OF STUDY AREA:

The study area is mainly focussed on the 200m. stretch on both sides of the river from Yamuna bridge in the western side to the Arail Chhatnag marg on the eastern side and Shastri bridge in the north. The river Yamuna runs a meandering course of about 3.7 kms. upto sangam area from the Yamuna bridge.The river Ganga runs a course of about 1 km. from Shastri bridge to the sangam area and then turns towards east and runs a course of around 1.9 kms. upto Arail Chhatnag marg.

6.3 RIVER HYDRAULICS

6.3.1 ***Width of Waterway***: The width of waterway along the New bridge on Yamuna river is around 860m.The width of Ganga river along Shastri bridge i 415m.The width of Ganga river along the Arail Chhatnag marg is 860m.

6.3.2 *Water level in Sangam area*

The existing water level in the Sangam area(the area where the confluence of Yamuna and Ganga takes place) as recorded at various time intervals is as follows:

Table 6.1: Water level at Sangam

DATE	TIME	WATER LEVEL
9th June '07	8 a.m.	71.16 m.
26th Aug.'07	8-10 a.m.	76.71m.
26th Dec. '07	8 a.m.	71.875m.

[Source: Central Water Commission, Middle Ganga Yamuna Subdivision, Tularambagh, Allahabad]

6.3.3 *High Flood Level:*

The High Flood level in 1978 was 88.94 m. and in 1954, it was 88.97 m.
[Source: Flood Division Board, Mumfordganj, Allahabad]

Table 6.2 : High Flood level in the river at various points

S.NO.	Name of River	High Flood level(m.)	Danger water level(m.)
	River Ganga		
1.	Phaphamau	87.98	84.734
2.	Chhatnag	88.39	84.734
3.	Mori gate	88.37	84.75
	River Yamuna		
1.	Naini	87.99	84.734
2.	Saraswati Ghat		84.734
3.	Chachar nala		84.734

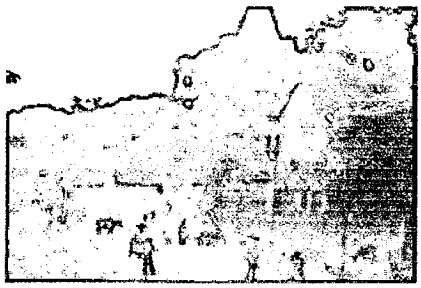
[Source: Irrigation Dept., Flood division, Allahabad]

6.3.4 *Scour & Fill of River Ganga*

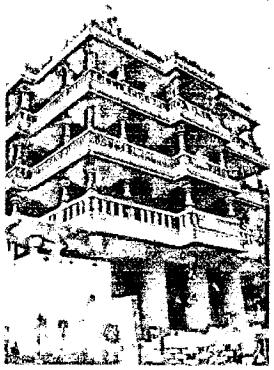
1. In 2005,Ganga was diverted by 800m. towards left bank.
2. In 2007,it was diverted by about 1 km. from right bank.
3. Flood Plains of Ganga are of 6km. length.
4. Ganga Bed Level is above that of Yamuna i.e. Yamuna river is deeper than Ganga river.
   [Source: Flood Division Board,Mumfordganj,Allahabad]

6.4 EMBANKMENTS

There is an existing embankment on the Sangam area upto Hanuman Temple.At the time of flood, the temple gets submerged in the flood water.There is another temple called Shankar Viman Mandapam built on piles above the embankment. It does not get submerged during floods.



i)The Shankar viman Mandapam temple & the embankment



ii)The Shankar Viman Mandapam temple on stilts

Plate 6.b)
Source:author

6.5 EXISTING LANDUSES AND DEVELOPMENTS ALONG THE RIVERFRONT:

The area has been divided into 17 zones from the Yamuna bridge in the west to the Arail Chhatnag marg in the east and Shastri bridge in the north. A depth of 200m. is taken as the area under study from the banks of the river.

Zone 1:

AREA /ZONE	AREA (SQ.M.)	CODI-NG	PURPOSE (PRESENT)	PRESENT USAGE	EXISTING PROBLEMS
1. Yamuna Bridge to Boat club	120480	AB	Boating	Slums,boa-ting	Growth of slums in the area.

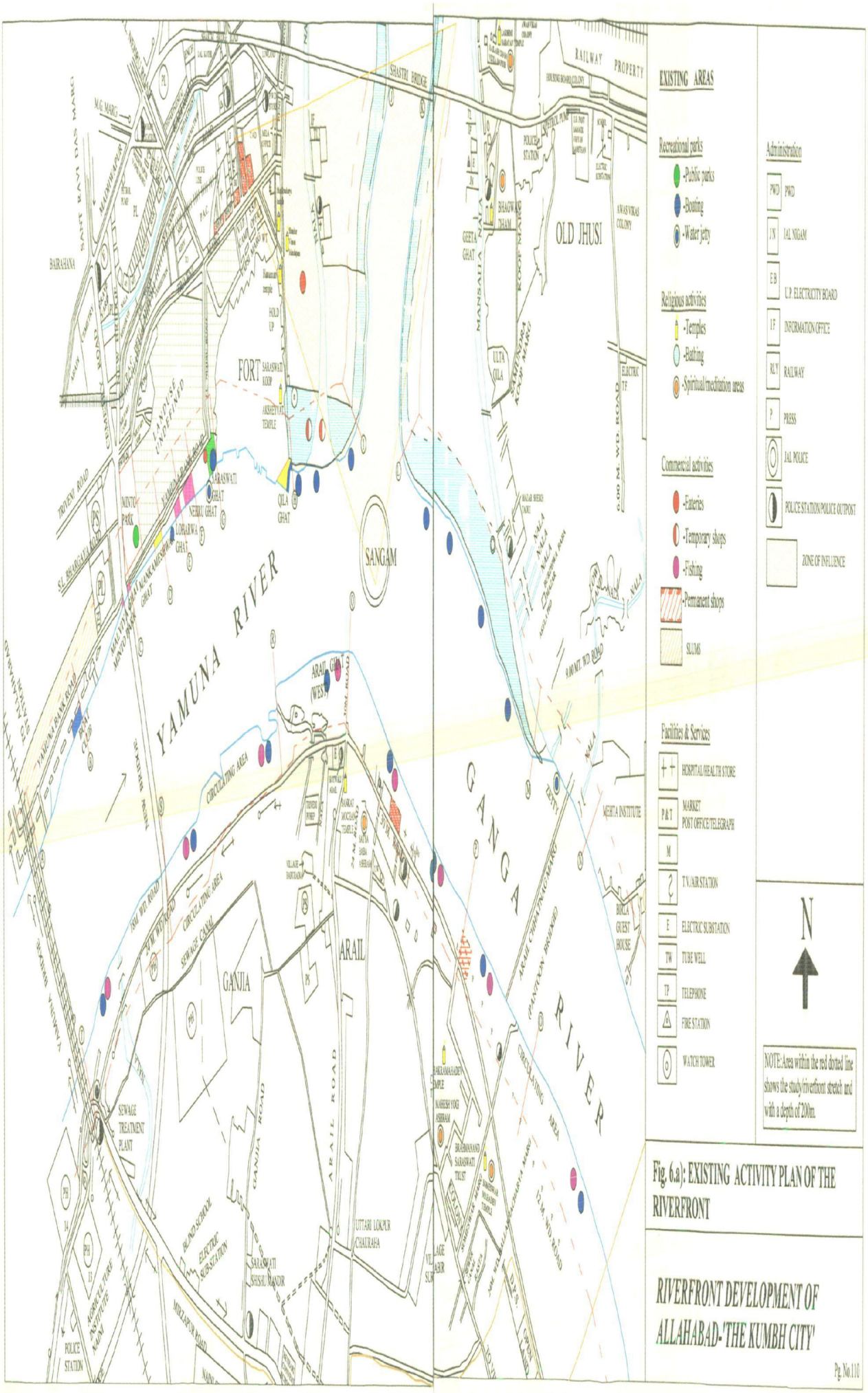
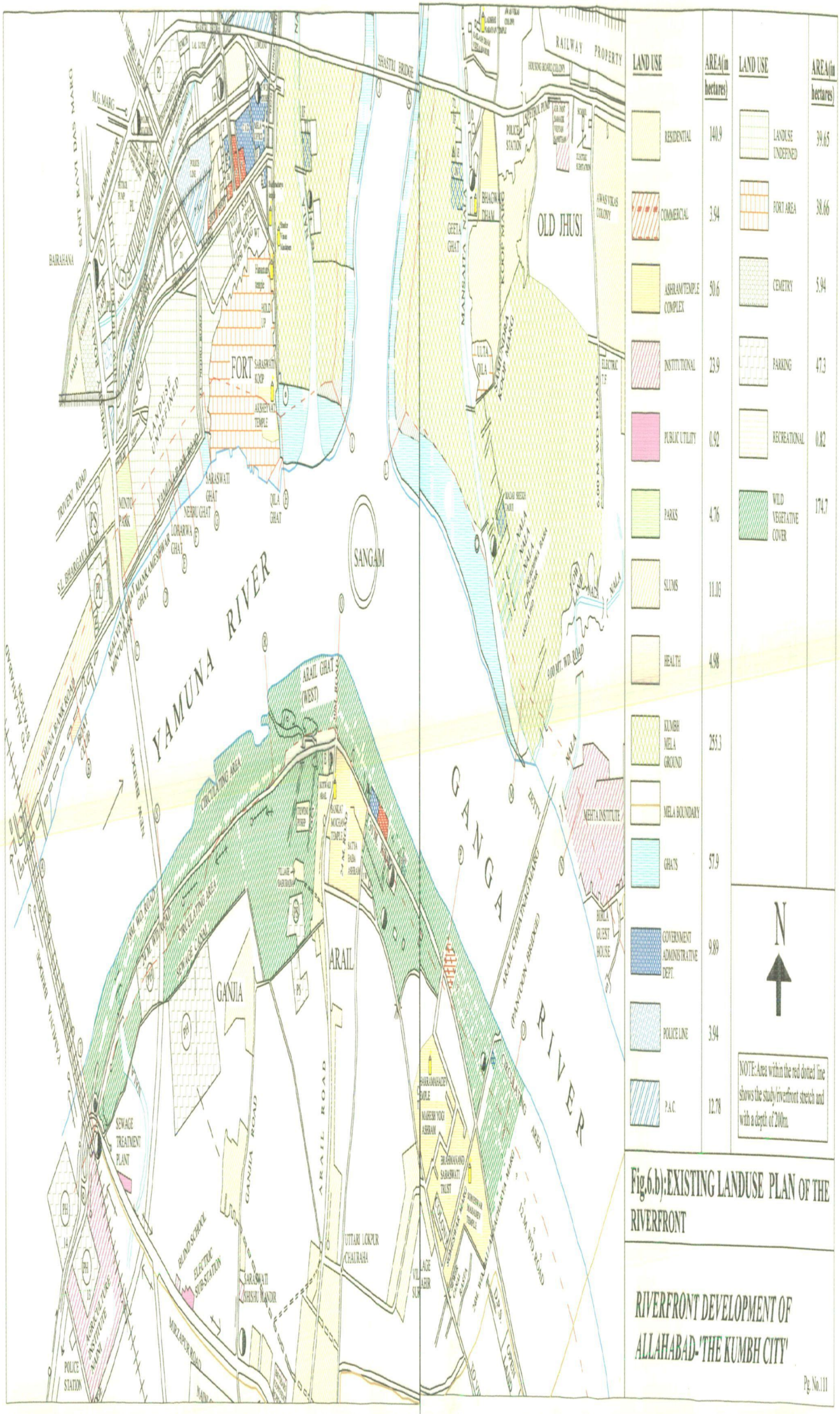


Fig. 6.a): EXISTING ACTIVITY PLAN OF THE RIVERFRONT

RIVERFRONT DEVELOPMENT OF ALLAHABAD-THE KUMBH CITY



LAND USE	AREA(in hectares)
RESIDENTIAL	140.9
COMMERCIAL	3.94
ASHRAM/TEMPLE COMPLEX	50.6
INSTITUTIONAL	23.9
PUBLIC UTILITY	0.92
PARKS	4.76
SLUMS	11.03
HEALTH	4.98
KUMBH MELA GROUND	255.3
MELA BOUNDARY	
GHATS	57.9
GOVERNMENT ADMINISTRATIVE DEPT.	9.89
POLICE LINE	3.94
P.A.C.	12.78

LAND USE	AREA(in hectares)
LANDUSE UNDEFINED	39.65
FORT AREA	38.66
CEMETRY	5.94
PARKING	47.3
RECREATIONAL	0.82
WILD VEGETATIVE COVER	174.7

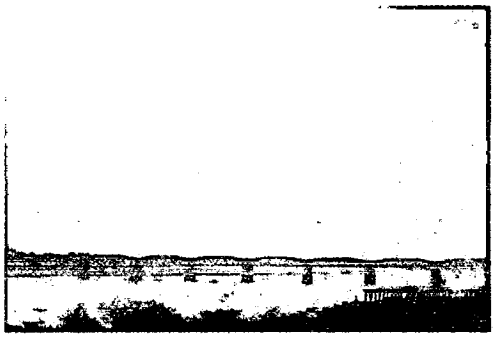
N

NOTE:Area within the red doted line shows the study riverfront stretch and with a depth of 200m.

Fig.6.b):EXISTING LANDUSE PLAN OF THE RIVERFRONT

RIVERFRONT DEVELOPMENT OF ALLAHABAD-'THE KUMBH CITY'

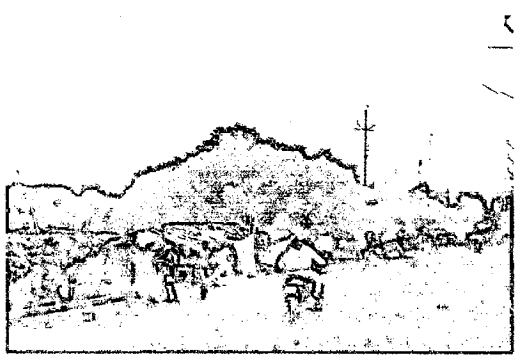
This area is at the upstream of the river Yamuna.



i) Yamuna bridge over river Yamuna
Plate 6.c)
Source:author

ii) Boat club on the river banks

Many unauthorized developments have come up in this area. Slums have come up along the other side of the road along the river bank.

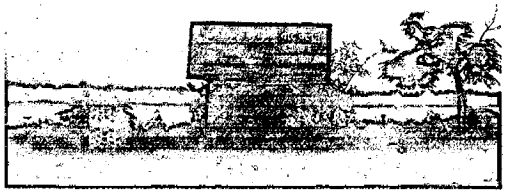


i) Slums along the road
Plate 6.d)
Source:author

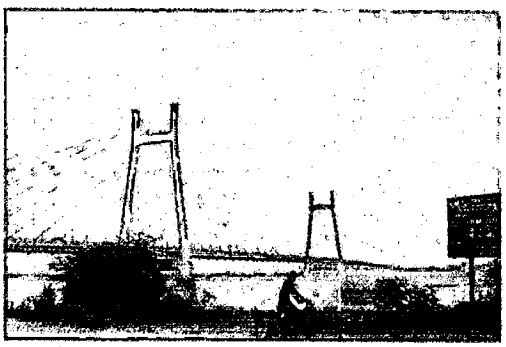
ii) Slums along the road

Zone 2:

AREA /ZONE	AREA (SQ.M.)	CODI-NG	PURPOSE (PRESENT)	PRESENT USAGE	EXISTING PROBLEMS
2. Boat club to Malviya Ghat	124800	BC	Fishing	Slums and vegetation	No proper ghat existing



i) Light vegetation along the bank
Plate 6.e)
Source:author



ii) The New bridge over Yamuna river

This portion of the riverfront has some vegetative cover and is undeveloped. The New bridge connecting the city to the Naini area exists in this zone. It is built by suspended cables. It is beautiful to look at, at night when the lights show over the bridge.

Zone 3:

AREA /ZONE	AREA (SQ.M.)	CODI-NG	PURPOSE (PRESENT)	PRESENT USAGE	EXISTING PROBLEMS
3. Malviya Ghat to Mankameshwar ghat	72000	CD	Religious activities	Undeveloped Ghats,existing Minto park	The ghats are not properly developed

The area is characterized by undeveloped ghats with mild vegetation. There is presence of temples on these ghats. Since the river Yamuna is deep here, bathing activities do not take place here.

Zone 4:

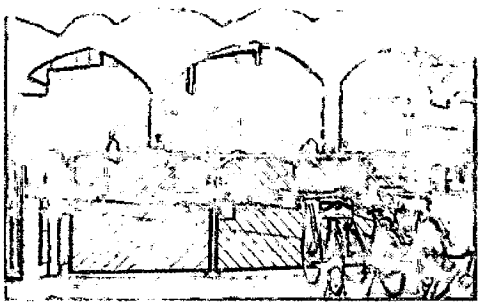
AREA /ZONE	AREA (SQ.M.)	CODI-NG	PURPOSE (PRESENT)	PRESENT USAGE	EXISTING PROBLEMS
4.Mankameshwar ghat to Loharwa Ghat	42480	DE	Fishing	Undeveloped Ghats	The ghats are not properly developed

Zone 5:

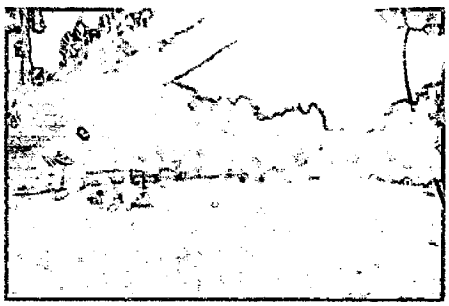
AREA /ZONE	AREA (SQ.M.)	CODI-NG	PURPOSE (PRESENT)	PRESENT USAGE	EXISTING PROBLEMS
5.Loharwa Ghat to Nehru Ghat	29520	EF	Fishing	Undeveloped ghats	The ghats are not properly developed

Zone 6:

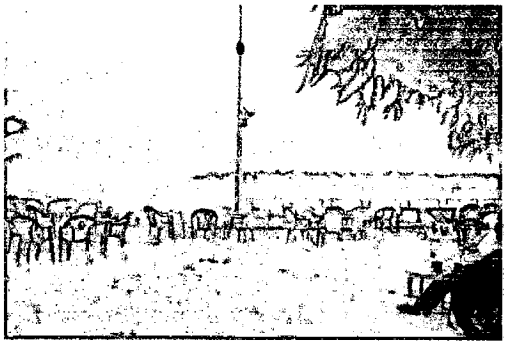
AREA /ZONE	AREA (SQ.M.)	CODI-NG	PURPOSE (PRESENT)	PRESENT USAGE	EXISTING PROBLEMS
6.Nehru Ghat to Saraswati Ghat	48720	FG	Recreation, boating	Pucca ghats,Park, eateries, boating	Make it more accessible to public.



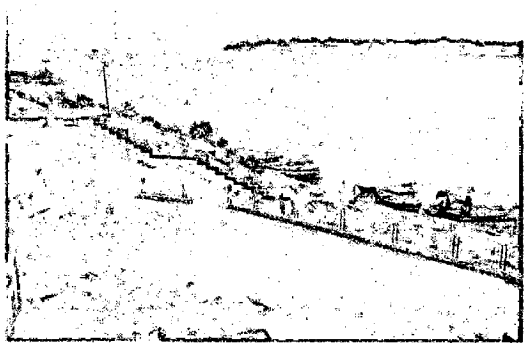
i) Eateries on the Saraswati ghat



ii) Newly built park on the ghat



iii) Sitting areas on the ghats



iv)Permanent ghat and boating facility

Plate 6.f)
Source: author

Zone 7:

AREA /ZONE	AREA (SQ.M.)	CODI-NG	PURPOSE (PRESENT)	PRESENT USAGE	EXISTING PROBLEMS
7. Saraswati Ghat to Qila Ghat	156960	GH	Bathing at Qila ghat,boating	The ghat has been made permanent	The ghat is very narrow.

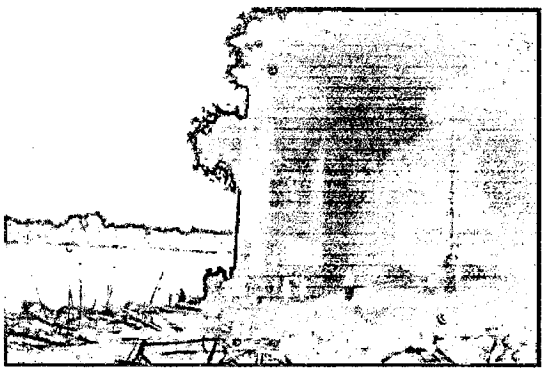
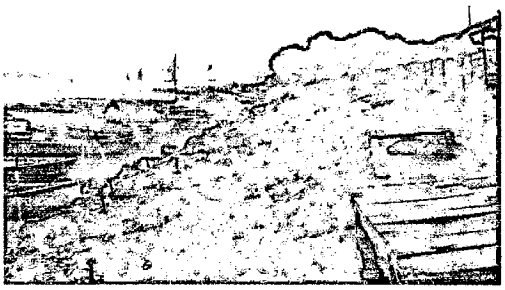


Plate 6.g) The Qila Ghat
Source: author

Zone 8:

AREA /ZONE	AREA (SQ.M.)	CODI-NG	PURPOSE (PRESENT)	PRESENT USAGE	EXISTING PROBLEMS
8. Qila Ghat to the Sangam bank	139200	HI	Boating, bathing	Bathing ghats,boating ,religious activities	The ghat is not permanent.



i) The Sangam bank

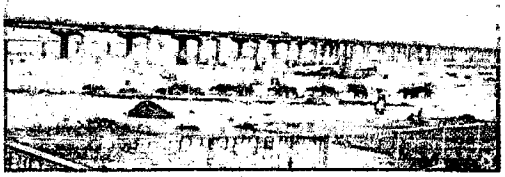
ii) The bathing ghats

Plate 6.h)
Source:author

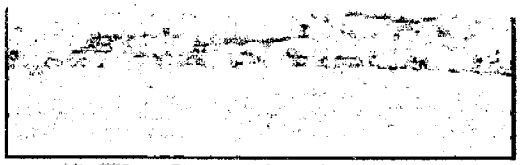
This area is characterized by religious activities including puja, bathing and boating to the point of Sangam (the confluence of Ganga and Yamuna)for bathing at that point. This is the focal area of Kumbh mela.

Zone 9:

AREA /ZONE	AREA (SQ.M.)	CODI-NG	PURPOSE (PRESENT)	PRESENT USAGE	EXISTING PROBLEMS
9. Sangam bank to Shastri bridge(City side)	203520	I J	Boating, bathing	Bathing ghats,boating ,religious activities	The ghat is not permanent.



i) Shastri bridge over river Ganga



ii) The Ganga bank

Plate 6.i)
Source:author

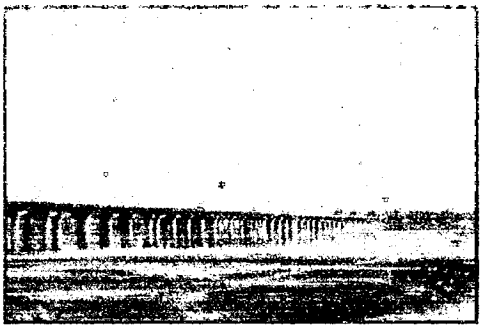


Plate 6.j):The Shastri Bridge connecting Jhusi
Source:author

This area is also characterized by boating and bathing on the ghats. The area is undeveloped and mild vegetation can be found in the area. This stretch is also included in the Kumbh mela township.

Zone 10:

AREA /ZONE	AREA (SQ.M.)	CODI-NG	PURPOSE (PRESENT)	PRESENT USAGE	EXISTING PROBLEMS
10. Shastri bridge to the sangam bank(Jhusi side)	208800	KL	Boating, bathing	Bathing ghats	The ghat is not permanent.

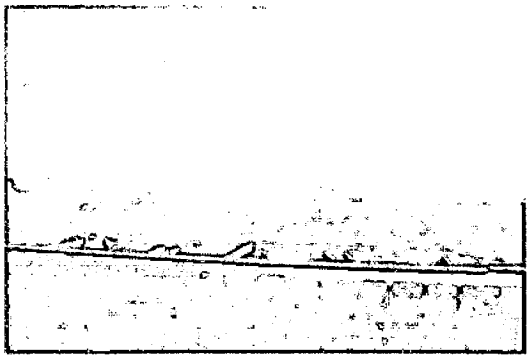
i)The Shastri Bridge connecting Jhusi
Plate 6.k)
Source:author

ii)Preparations for magh mela being done on the ghats

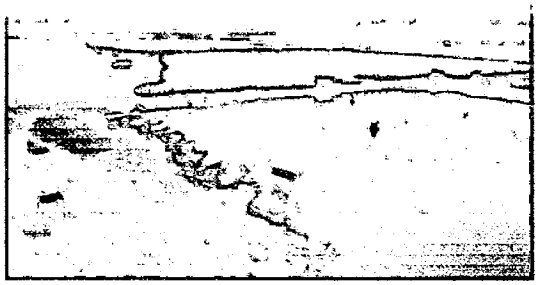
Large amount of open land exists in this area.Boating and bathing activities take place in the area. Large tracts of land in this area are occupied when the Kumbh/magh mela takes place.

Zone 11:

AREA /ZONE	AREA (SQ.M.)	CODI-NG	PURPOSE (PRESENT)	PRESENT USAGE	EXISTING PROBLEMS
11. Ganga bank(Jhusi side)	319680	LM	Boating, bathing	Ghats,boating	The ghat is not permanent.



i) Preparations for magh mela on Jhusi ghats
Plate 6.l)
Source: author



ii) The Jhusi ghats

Zone 12:

AREA /ZONE	AREA (SQ.M.)	CODI-NG	PURPOSE (PRESENT)	PRESENT USAGE	EXISTING PROBLEMS
12.Ganga bank upto Mehta institute(Jhusi side)	121200	MN	Boating, Water jetties	Undeveloped ghat	The ghat is undeveloped.

Zone 13:

AREA /ZONE	AREA (SQ.M.)	CODI-NG	PURPOSE (PRESENT)	PRESENT USAGE	EXISTING PROBLEMS
13. Arail Ghat	160080	OP	Fishing	Wild Vegetation,undeveloped land	The ghat is undeveloped and lack of security.

Plate 6.m):Vegatation can be seen on the arail ghat
Source: author

Zone 14:

AREA /ZONE	AREA (SQ.M.)	CODI-NG	PURPOSE (PRESENT)	PRESENT USAGE	EXISTING PROBLEMS
14. Arail Ghat(upto Sangam area)	285600	PQ	Fishing,boating	Boating,undeveloped land,vegetation	The ghat is undeveloped and lack of security.

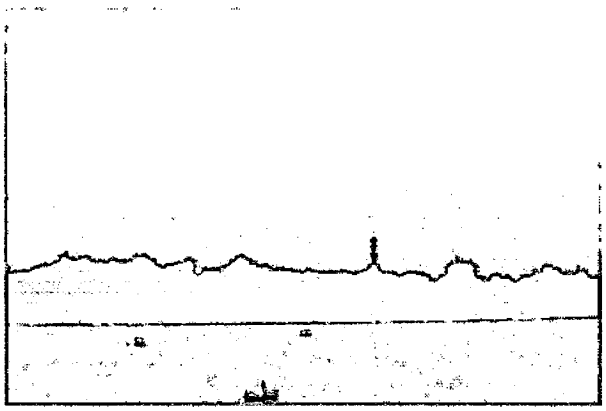


Plate 6.n):Boating on the Arail ghat
Source:author

Zone 15:

AREA /ZONE	AREA (SQ.M.)	CODI-NG	PURPOSE (PRESENT)	PRESENT USAGE	EXISTING PROBLEMS
15. Arail Ghat	136800	QR	Fishing,boating	Undeveloped land,wild vegetation	The ghat is undeveloped and lack of security.

Zone 16:

AREA /ZONE	AREA (SQ.M.)	CODI-NG	PURPOSE (PRESENT)	PRESENT USAGE	EXISTING PROBLEMS
16. Arail Ghat(upto New Bridge)	247200	RS	Fishing,boating	Undeveloped land,wild vegetation	The ghat is undeveloped and lack of security.

Plate 6.o):The Arail ghat
Source:author

Zone 17:

AREA /ZONE	AREA (SQ.M.)	CODI-NG	PURPOSE (PRESENT)	PRESENT USAGE	EXISTING PROBLEMS
17.Arail Ghat(New Bridge to Yamuna bridge)	202320	ST	Fishing,boating	Undeveloped land,wild vegetation	The ghat is undeveloped and lack of security.

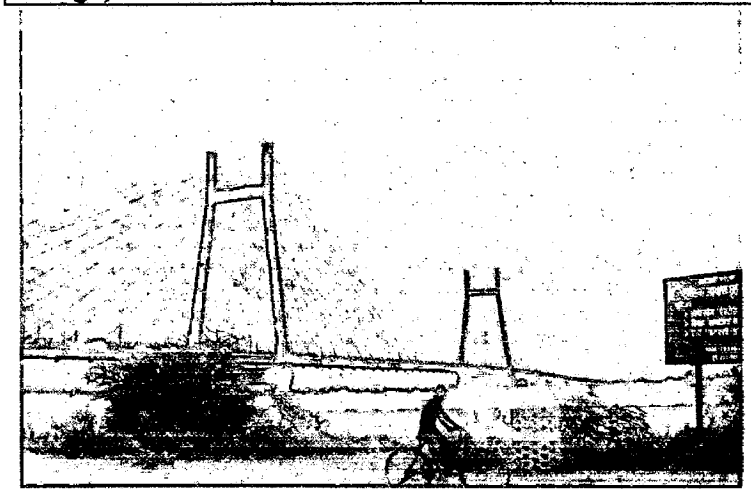
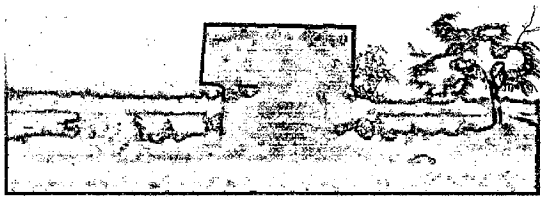


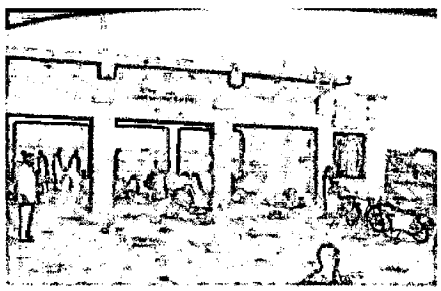
Plate 6.p):The New Bridge
Source:author

6.6 EXISTING ISSUES ON THE RIVERFRONT AREA

1. Absence of public amenities on the Sangam area.The amenities include the public toilets,resting spaces,sheds,eating joints,changing rooms near the area.
2. There are only a few facilities provided at some places on the riverfront. They are as below:



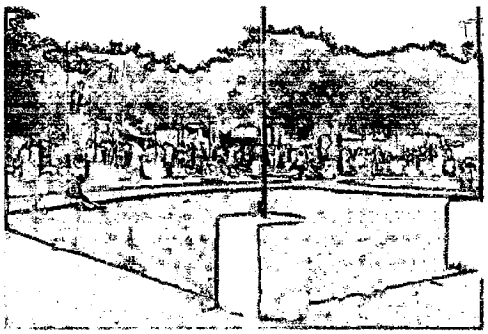
i) A boat club provided on the riverfront



ii) Rainbasera on the sangam area

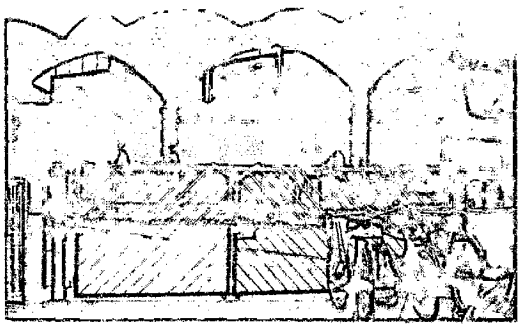
iii) Boating facilility to reach the point of sangam

iv) Qila ghat on the Fort

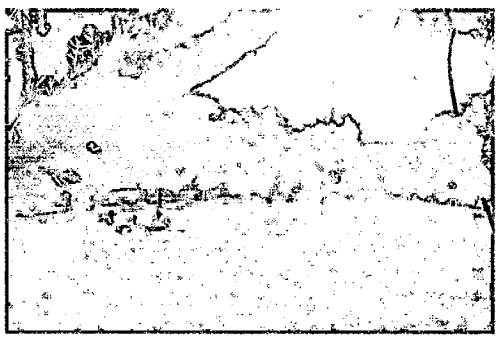


v) The Hanuman Mandir & the landscaping done around

vi) The Akbar's fort on the riverfront

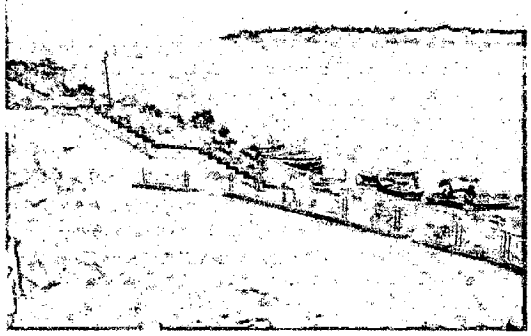


vii) Food kiosks provided on the Saraswati Ghat



viii) Open parks provided on the Saraswati Ghat

ix) Sitting spaces along the river at Saraswati Ghat

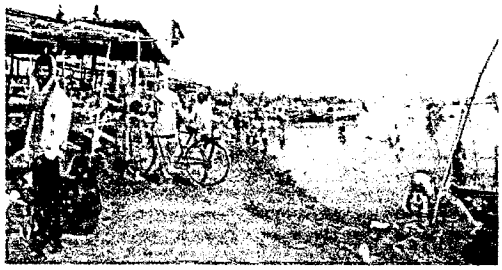


x) Boating along the permanent ghat at Saraswati Ghat

Plate 6.q)
Source: Author

3. There are no proper ghats on the Sangam area.

i)



ii)

Plate 6.r) The temporary ghats on Sangam area
Source:author

4. Public buses are needed for the convenient commutation of the people.
5. The thrust of the existing Kumbh ground needs to be shared by new mela grounds.
6. Water circuit routes are missing in Allahabad.
7. Lack of any security on the riverfront.
8. Improper solid waste disposal on the ghat grounds.

Plate 6.s) Garbage on the ghats
Source: author

9.Pollution in the river is increasing day by day.
10. Lack of traditional, religious shops on the ghats.
11. Lack of drinking water facility on the ghats.
12. Vegetable markets can be proposed along the riverfront.
13. Permanent ghats can be made on the Daraganj side of the river as there the river does not change course.
14. Embankments can be made on the riverside.
15. On the Jhusi side the river is very deep due to the conjunction of both the rivers, so bathing can't be done but recreational parks can be provided.

[Source:Primary survey]

6.7 POLLUTION IN THE RIVER:

The rivers Ganga and Yamuna are getting increasingly polluted with the physical and economic development of the city. In the table below, the BOD levels and total coliform level of the river at various places at Allahabad are given.

Table 6.3: Analysis report of river Ganga & Yamuna during Magh-mela 2008 at Allahabad

Sampling pts.	Date & Time of Sampling (7.00 to 10.00 A.M.)	Temp.(0 Ded.Celsius)	PH Value	Dissolved Oxygen (milligrams per litre)	Bio-chemical Oxygen Demand(milligram per litre) of date 24/12/07	Total Coliform(most probable no. per 100 millilitre) of date 24/12/07
1. U/S Ganga,Rasoolabad Ghat(Phaphamau side) Alld.	27/12/07	18.0	8.22	9.2	3.0	3100
2. D/S Shastri Bridge(D/S Salori Nala) Ganga,Alld.	27/12/07	18.0	8.43	8.6	3.3	6300
3. Main Sangam,Alld.(After confluence of river Yamuna)	27/12/07	18.5	8.5	8.4	3.4	4900
4. D/S Ganga(D/S Sangam),Alld.	27/12/07	18.5	8.24	8.1	3.5	8000
5. Saraswati Ghat,Yamuna,Alld.	27/12/07	19.0	8.00	7.9	2.0	2300
STANDARDS			6.5-8.5	Minimum 5.0	Maximum 3.0	MPN 500/100ML.

Source: U.P. Pollution Control Board, Regional Office, Allahabad

The main sources of pollution are as under:

1. The untreated water of the drains pouring the sewage directly into the rivers.
2. The garbage deposited along the banks of the rivers or directly thrown into the rivers.
3. The untreated industrial wastes thrown into the rivers.

4. The harmful chemicals and pesticides from agricultural farms flowing into the river.
5. The dead bodies of human beings and animals thrown into the rivers.
6. The offerings in the rivers at the time of festivals and Kumbh or Magh mela.

There are a total of 13 open drains in the city which drain off the untreated sewage into Ganga & Yamuna causing increase in the pollution of the river. They are:

1. Ghaghar nala
2. Chanchar nala
3. Emergency outfall
4. Nala gate No. 9
5. Gate No. 13 outfall
6. Qila Nala
7. More gate / Daraganj nala
8. Nagbasuki-Daraganj nala
9. Allenganj nala
10. Salori nala
11. Teliarganj nala
12. Rajapur-Rasoolabad nala
13. Mavaiya nala

There are a total of 57 sewers pouring treated and untreated sewage into the rivers. The names of sewers and their point of discharge are as under:

Table 6.4:List of Sewers at Allahabad

SERIAL NO.	NAME OF NALA	MEASURED DISCHARGE 1998-99(MLD)	EXPECTED AV. DISCHARGE (MLD)			POINT OF DISCHARGE
			2005	2020	2035	
1.	Main Ghanghar Nala	40.0	40	50	64	Yamuna river

2.	Ghaghar Nala 1'A'	4.0	4.0	5.0	6.5	Yamuna river
3.	Ghaghar Nala 1'A'-1	0.2	0.2	0.4	0.6	Yamuna river
4.	Ghaghar Nala 1'B'	0.75	0.75	1.5	1.8	Yamuna river
5.	Dariabad Katharaghat Drain	0.1	0.1	0.15	0.20	Yamuna river
6.	Dariabad-Jogighat Drain	0.05	0.05	0.06	0.10	Yamuna river
7.	Dariabad-Pipalghat Drain	0.03	0.03	0.04	0.05	Yamuna river
8.	Chachar Nala	34.0	34.0	41.3	52.8	Yamuna river
9.	Emergency Outfall drain(through existing sewer)	18.25	18.25	22.2	28.4	Yamuna river
10.	Drain at Gate No. 9	2.0	2.0	3.0	4.0	Yamuna river
11.	Drain at Gate No. 13	4.0	4.0	5.3	7.0	Yamuna river
12.	Fort drain No. 1	-	-	-	-	Yamuna river
13.	Fort drain No. 2	-	-	-	-	Yamuna river
14.	Morigate Nala including Mumfordganj drain	33.94	33.94	42.4	53.7	Ganga river
15.	Drains at Daraganj area	3.0	3.0	4.0	5.0	Morigate Nala
16.	Allenganj Nala	27.0	27.0	32.0	42.0	Salori Nala
17.	Salori Nala	27.0	27.0	32.0	42.0	Salori Nala
18.	Joridhawal Nala	2.5	2.5	3.1	3.9	Ganga river
19.	Sankarghat Nala	0.2	0.2	0.21	0.31	Ganga river
20.	Rasoolabad Puccaghat drain	0.04	0.04	0.05	0.06	Ganga river
21.	A.D.A. Colony Nala	1.6	1.6	1.95	2.5	Ganga river

22.	Jodhawal Rasoolabad Drain (Murdaghat)	0.07	0.07	0.08	0.11	Ganga river
23.	Shankarghat Colony Drain	0.01	0.01	0.01	0.02	Ganga river
24.	Jondhawal Ghat Drain	0.07	0.07	0.08	0.11	Ganga river
25.	Rajapur Nala	7.0	7.0	8.5	10.1	Ganga river
26.	TV Tower Nala	2.0	2.0	2.45	3.10	Rajapur Nala
27.	Sadar Bazar Nala	3.0	3.0	3.65	4.7	Rajapur Nala
28.	Unchawa Garhi Drain-1	0.7	0.7	0.85	1.10	Rajapur Nala
29.	Unchawa Garhi Drain-2	0.25	0.25	0.3	0.40	Rajapur Nala
30.	Beligaon Drain	0.25	0.25	0.3	0.4	Rajapur Nala
31.	Mumfordganj Drain(Balance discharge)	0.4	0.4	0.5	0.62	Rajapur Nala
32.	Murabad Nala	1.0	1.0	1.21	1.55	Rajapur Nala
33.	Naya Purwa Drain	0.06	0.06	0.07	0.10	Rajapur Nala
34.	Mehdanri Gaon Drain	0.2	0.2	0.25	0.31	Rajapur Nala
35.	Mawariya Nala	9.0	9.0	11.0	14.0	Ganga River
36.	Shivkuti Drain-1	0.02	0.02	0.02	0.03	Ganga River
37.	Shivkuti Drain-2	0.01	0.01	0.01	0.02	Ganga River
38.	Shivkuti Drain-3	1.6	1.6	1.95	2.5	Ganga River
39.	Shivkuti Drain-4	0.01	0.01	0.01	0.02	Ganga River
40.	Shivkuti Drain-5	0.01	0.01	0.01	0.02	Ganga River
41.	Shivkuti Drain-6	0.02	0.02	0.02	0.03	Ganga River
42.	Shivkuti Drain-7(East)	0.72	0.72	0.9	1.15	Ganga River
43.	Chilla Drain	--	-	-	-	Ganga River
44.	Govindpur Purani Basti Drain	-	-	--	-	Ganga River
45.	Govindpur Drain No.1	-	-	-	-	Ganga River
46.	Govindpur Drain No.2	-	-	-	-	Ganga River
47.	Govindpur Drain No.3	-	-	-	-	Discharge in pond
48.	Govindpur Drain No.4	-	-	-	-	Discharge in pond
49.	Cooperative drain	-	-	-	-	Discharge in pond
50.	Basna drain	-	-	-	-	Carrier Seepage

						of Canal water
51.	Inder awas drain	0.23	0.23	0.3	0.40	Carrier Seepage of Canal water
52.	Shivpur Drain	-	-	-	-	Carrier Seepage of Canal water
53.	Lotey Haran Drain	2.15	2.15	2.6	3.38	Ganga River
54.	Shastri Bridge Nala	0.02	0.02	0.02	0.03	Ganga River
55.	Kodra Nala	6.75	6.75	8.25	10.5	Ganga River
56.	Nehru Park Nala	0.5	0.5	0.6	0.8	Ganga River
57.	Ponghat Nala	1.75	1.75	2.15	2.75	Ganga River

Source:NRCD (National River Conservation Department) report

According to 2003 report on drains:
i) 116 mld drainwater goes in Ganga
ii) 97 mld drainwater goes in Yamuna
iii) Total is 213 mld
[Source : NRCD(National River Conservation Department)]

6.8 SLUMS & SQUATTER SETTLEMENTS

The vacant land along the riverfront is increasingly being occupied by slums and squatter settlements. The area between the Yamuna bridge to Malviya ghat has been occupied by a large number of slum settlements.

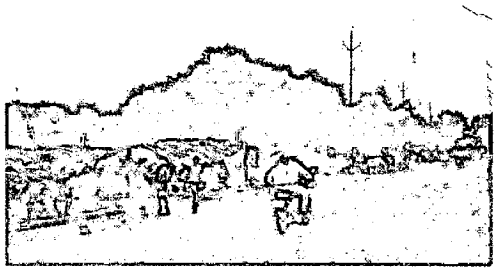


Plate 6.t) Slums along the riverfront
Source: author

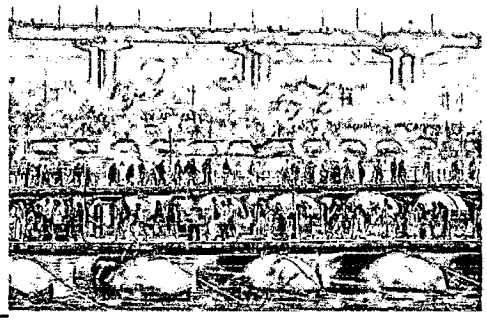
6.9 KUMBH MELA AND MAGH MELA AT SANGAM

The Kumbha Mela is held every 12th year and the Ardha Kumbha Mela held every 6th year. Kumbh Mela (the Urn Festival) occurs four times every twelve years and rotates between four locations: Prayag (Allahabad), Haridwar, Ujjain and Nashik.

Table 6.5 : Floating Population

S.No.	Occasion	Population gathered(lakhs)	Proposed Area (acres)	Expenditure
1.	Magh mela 2008	85	1400	1229 lakhs
2.	Ardh kumbh Jan.-Feb.2007	700	4000	170 crore
3.	Kumbh 2001	300	4200	-
4.	Kumbh 1989	150	3600	-
5.	Kumbh 1977	100	2655	-
6.	Kumbh 1966	70	2000	-
7.	Kumbh 1954	60	1400	-

i) Large no. of people taking bath at kumbh
Plate 6.u)
Source: author



ii) Pantoon bridges at Kumbh

6.9.1 Ardh kumbh at Allahabad held in Jan.-Feb.2007

About 7 crore hindus gathered at the Rs.170 crore religious festival. It is referred to by some as the largest human congregation in the world. It was a six weeks congregation.

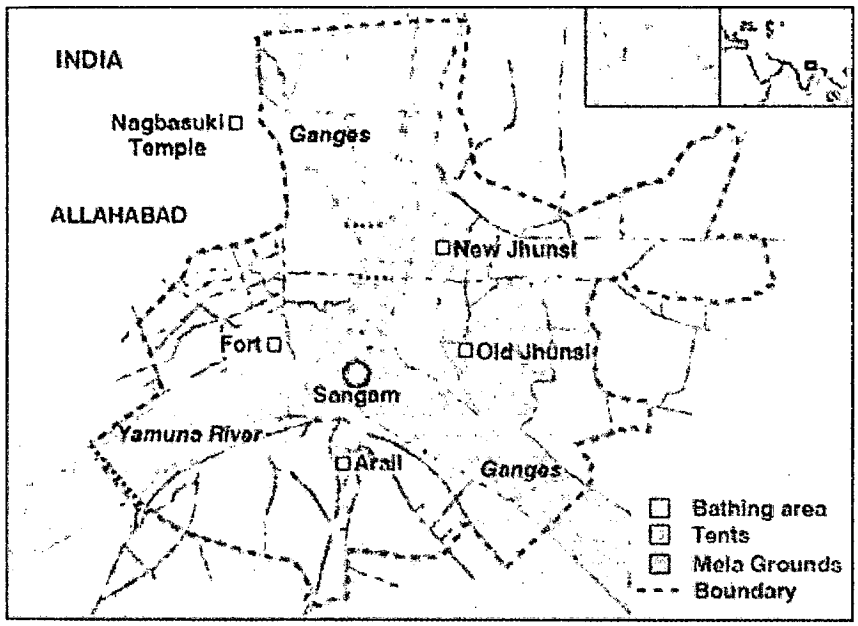
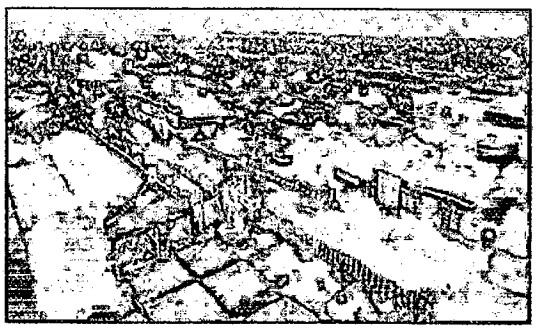


Fig. 6.c) The Mela grounds at Sangam
Source: author

A vast area of about 4,000 acres stretching for about eight kms along the Ganga and Yamuna riverbanks was converted into a giant tent township. The huge tented city was capable of housing two million devotees. A huge infrastructure was created including the laying of about 76 km. of thick steel sheets to serve as convenient walking paths on the sandy riverbanks,456 kms. of drinking water pipelines were laid ,a fully equipped 100-bed makeshift hospital was made and 14 primary health centres were created for visitors. 25,000 toilets were made to cope with the influx. Around 20,000 police had been deployed to control crowds, amid fears of stampedes.

i)



ii)

Plate 6.v):An entire temporary city of tents has sprung up and is being used to house the millions visiting.
Source:website

Mela compared :

Ardh Kumbh Mela, India: 70 million New Year's Eve Times Square, New York: 1 million

Hajj, Mecca, Saudi Arabia: 3 million

Population of UK: 60 million

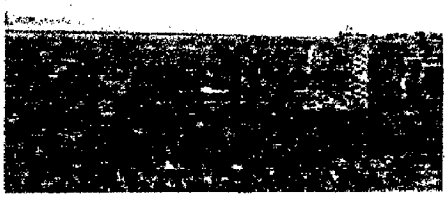


Plate 6.w):The kumbhmela ground after the mela is over
Source: author

6.9.2 Magh mela held in Jan-Feb 2008

The Magh Mela takes place every year in the month of Magh (Jan - Feb) of the Hindu calendar. The layout plan of the mela held in Jan.-Feb.2008 was prepared by the Mela office.

a) Around 1400 acres of land was required for the mela.

The various bath festivals and the population on those occassions are given in the table below:

Table 6.6: Population in the Magh mela Jan.-Feb.2008

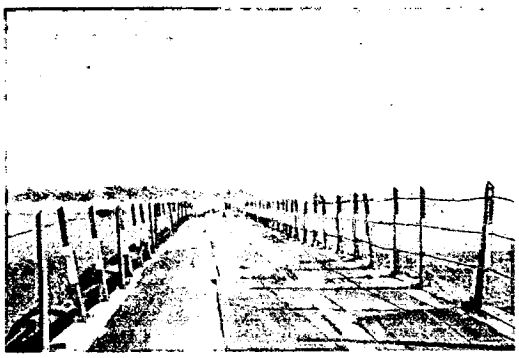
S.No.	Name of fest	Date	Population(in lakhs)
1.	Makar Sankranti	14.1.2008	30
2.	Paush Poornima	22.1.2008	35
3.	Mauni Amavasya	7.2.2008	85
4.	Basant Panchmi	11.2.2008	65
5.	Maghi Poornima	21.2.2008	35
6.	Maha Shivratri	5.3.2008	5

Source:Mela office,Allahabad

b) Bathing ghats were made on the following ghats:

1. Sangam
2. Ramghat
3. Dandibada
4. Acharyabada
5. Jhusi
6. Dashashwamegh Ghat
7. Arail ghat

c) Four pantoon bridges were made on the Ganga river.



i) Pantoon bridge connecting Jhusi Plate 6.x)
Source:author

ii) View of pantoon bridge

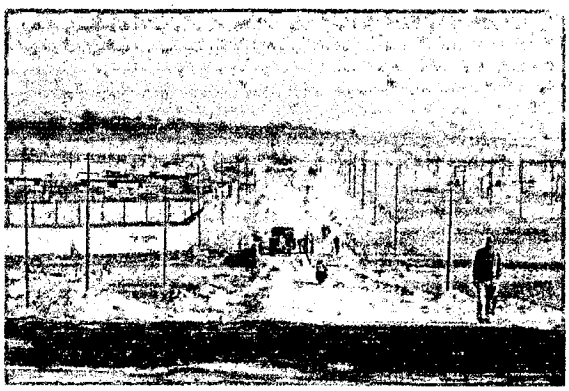
d) The budget for the mela is as follows:

Table 6.7: Budget for the Magh mela 2008

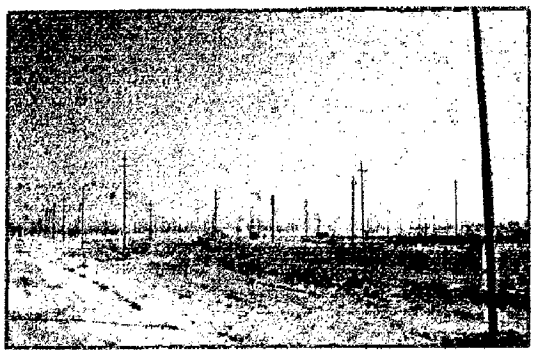
S.No.	Name of organisation	Budget (in lakhs Rupees)
1.	Administrative Dept.	250.79
2.	UP Jal Nigam	342.25
3.	Public Works Dept.	148.40
4.	UP Power Corporation Limited	271.00
5.	Health Dept.	174.72
6.	Flood Control Dept.	34.19
7.	Ayurvedic & Unani Dept.	4.25
8.	Homeopathic Dept.	2.95
	Total	1229

[Source: Mela office, Allahabad]

i) Temporary tents being set up for the mela



ii) Temporary road being made on the ghats



iii) The electric poles being set up on the ghats

iv) The land filling and levelling work being done on the ghats

Plate 6.y)
Source: author

6.10 POTENTIAL/POSITIVE ASPECTS OF RIVERFRONT DEVELOPMENT

The riverfront of Allahabad has a large potential to be explored. Riverfront development will help in release of prime land in the heart of the city. It will help in the recharging of ground water aquifers of the city and in the elimination of flood hazard. The development will help in attracting more tourists.Commercial spaces can be developed including informal markets like haats / weekly markets, vegetable/ fruit markets, food plazas and restaurants. City level recreational space can be developed with the provision of parks, playgrounds, water parks, water sports, fountain & light shows.

Separate ghats for cremation/immersion and bathing should be proposed. Rain basera and ashrams for religious groups, stage for religious speeches, hawan ground, yoga ashram, meditation center, old age homes can be developed. Permanent ghats can be constructed along the river bank. Facility zone along the Ghats (shops, changing room) can be developed. All proposed & existing ghats can be linked in the city with Sangam area. Beautification with proper provision of landscaping can be done on the Ghats. Sheds for sitting purpose and benches for sitting can be provided along the river side.The load of Kumbh Mela ground can be distributed along the riverfront.

Enchroachments by automobile service centres and slums have to be taken care of. Parking facility should be provided. Internal Roads covering the area can be developed. Circuit boat routs can be developed for site seeing in the city. Also water routes can be linked with different Jetty locations.

Thus, the development of the riverfront can provide many benefits for the overall city.

6.11 INFERENCES

The riverfront in the present state is quite undeveloped. It is a prime tourist destination constituting religious tourism. The citizens of Allahabad also need some recreational space and this area can be developed for recreational tourism as well. This will help in round the year development of the riverfront. This aspect of recreation is discussed later in the thesis.

References

1. Nandan Jiwesh,(2002),Mahakumbh;a Spiritual Journey,Rupa & Company,New Delhi
2. Allahabad Development Authority, Allahabad Master Plan 2021 Report
3. Town and Country Planning Dept. U.P., Allahabad Master Plan 2021 Report

Source of photographs from the websites are as below:

1. en.wikipedia.org/wiki/Allahabad
2. http://www.sacred-destinations.com/india/allahabad.htm

CHAPTER 7
GOVERNMENT INITIATIVES AND PROPOSALS

7.1 INTRODUCTION:

The Govt. has taken initiative in developing the riverfront of Allahabad. Some areas have been proposed for development. This chapter discusses the proposals of the Govt. and the extent of their success.

7.2 LAND-USE PROPOSALS BY THE GOVT. IN MASTER PLAN 2021 OF ALLAHABAD

Various areas proposed along the riverfront are:

1. 7.07 sq.km. for kumbh mela area.
2. 14.33 sq.km. for river bank development
3. 2.28 sq.km. for cultural & religious areas
4. A 200m. green belt has been proposed on both sides of the Ganga-Yamuna river.
5. In this green belt, religious maths, ashrams, and temples will be allowed provided:
    a) Ground coverage is 35% and F.A.R. 1.5.
    b) Drainage will not be directly into the river but into the other sewers.
    c) The areas having no sewage provision will have to provide for septic tanks.
6. The *sangam complex* has been included in the one of the three *heritage zones* of the city. The heritage zone is conserved by the archeological department and is a prime tourist destination of the city.

The Sangam complex includes

a) Sangam,
b) Hanuman mandir,
c) Shankar Viman Mandapam and
d) Fort .It includes the following:
    i) Ashok pillar
    ii) Saraswati Koop
    iii) Akshay vat
    iv) Rani Mahal
    v) Patalpuri mandir
    vi) Keedganj cemetery
    vii) Samudra koop

7.3 PROPOSALS FOR WATER POLLUTION CONTROL

The Govt. of India established *'Central Ganga Board'* on February 1985 for pollution abatement of the rivers.Central Ganga Board has started the following programmes for the control of pollution in the rivers:

1. Gaughat pumping station has been built with a cost of 3.26 crores. It will divert 16 crore litres of untreated sewage into the Naini-Dandi farm.
2. After the completion of Daraganj pumping station costing an amount of 1 crore ,the untreated waste will not fall into the Ganga river.
3. With the change in direction of Ghaghar nala,1.6 crore litres of untreated sewage will not fall into the Yamuna river.
4. Many drains have been merged with the sewer system and the sewers have been cleaned.
5. 38 public toilets have been built.
6. Daraganj and Allahpur sewer and pumping stations are being built up costing 1 crore.
7. The existing STP at Naini is of capacity 60 MLD. It will be extended to generate biogas, fertilizers and electricity from sewage. It will cost 8 crores of Rupees.
8. In Salori, an STP of capacity 29MLD is under construction.
9. With the aid of world bank, an electric crematorium has been built at Daraganj. Under the *Ganga Action plan*, another electric crematorium has been proposed near Shankarghat.

7.4 PROPOSALS FOR PREVENTING ENVIRONMENT POLLUTION

With an increase in population and industrial and economic activities in the city of Allahabad, the environment is getting polluted. Central Ganga Board is running a number of programmes to combat this problem. Some of them are as under:

1. Industries causing pollution have been proposed outside the city area.They have been proposed in the Naini area.
2. For the conservation of historic, cultural and tourist places, proposals have been made in the zoning regulations.
3. For the riverfront development, the area near the Saraswati ghat ,Rasoolabad ghat and Nehru ghat along the banks of Ganga and Yamuna have been proposed to be developed with a cost of 3.5 crores.

4. For the development of Yamuna riverfront, the area from Baluaghat to the Fort is under consideration for development.

In the table below, the various schemes by the Allahabad Development Authority for the riverfront development have been given and their present status is described below:

Table 7.1 : Status of various schemes of the riverfront

Schemes	**Status**
Boat Club	Operational but not permanently
Recreational Saraswati Ghat	Operational
Landscaping around Hanuman mandir	Operational
Riverfront development at Rasoolabad ghat	Under proposal
Riverfront development at Nehru ghat	Under proposal
Riverfront development in the area from Baluaghat to the Fort	Under proposal

Source: Primary and secondary data

7.5 INFERENCES

Various proposals have been given in the Master plan 2021 for the development of the riverfront. But they are in a piecemeal manner. A continuous development of the riverfront is necessary for its overall development. Also, the proposals need to be implemented in an effective manner.

References:

1. Allahabad Development Authority,Allahabad Master Plan 2021 Report
2. Town and Country Planning Dept. U.P.,Allahabad Master Plan 2021 Report.

CHAPTER 8
ANALYSIS & FORMATION OF STRATEGIES

8.1 INTRODUCTION

This chapter deals with various strategies for a comprehensive development of the riverfront.They are proposed keeping in view the area and nature of the problems which the different stretches of the riverfront are exposed to based on the primary survey. An analysis has been made of the various suggestions provided by the citizens of the city.

8.2 VIEWS OF THE CITIZENS OF ALLAHABAD

A survey was conducted in Oct.-Nov. 2007 and again in Jan.2008 and in all, 50 sample size was taken. Out of 50, 20 were local citizens living in that region, rest 30 were prominent people. The 20 local citizens included the locally employed people, boatmen, hawkers, vegetable sellers i.e. those with livelihood along the banks. The 30 prominent people included 10 engineers from ADA, Jal Nigam, Railways, PWD and Town Planning Dept. 10 people were teachers and lawyers from Allahabad. 5 samples were taken from businessmen, hoteliers, restaurant owners. The rest 5 samples were taken from senior technocrats, beaurocrats and city administrators.

The questions asked covered various aspects including security, transport facilities to the area from the city, facilities required on the banks, their proposals, negative aspects and positive viewpoints.

The questionnaire for the citizens is as follows:

1. Which part of the river has a strong impression and should be developed first?
2. Which portions of the riverfront you do not like to visit and why?
3. What is the kind of connectivity to the riverfront and which kind of mode of transport is needed?
4. What additional facilities you would like on the riverfront?
5. What inconveniences are faced by you on the Sangam area?
6. What about the pollution level of the river?
7. What should be the immediate priority activity introduced in the riverfront?
   a) boating b) recreation spaces c) guest house and others
   d) institutional development e) local markets/haats
8. Would you like to enjoy in recreational parks along the river?

9. Would about the security level on the riverfront?
10. What should be the priority of the govt. in undertaking the following aspects:

a) pollution
b) security
c) creation of facilities at town level(playgrounds e.t.c.)
d) to introduce or popularize some basic features

The questionnaire for the officials had the following additional aspects:

1. What have been the efforts of the govt. in the past regarding the provision of boating facilities along the riverfront?
2. What problems have been faced by the govt. regarding the provision of boating facilities along the riverfront?
3. Can provision of ferries be made for the commutation of people from Naini side/Jhusi side to the city side?
4. What efforts have been made for the development of riverfront along Ganga river?
5. What additional provisions can be made for the development of riverfront along Ganga(e.g. const. of embankments e.t.c.)?
6. Should local markets like haats be provided along the riverfront?

These questionnaires threw light on the perception of locals and the officials. Out of this data, after analyzing, the outcome is as follows:
The activities along the Ghats are given priority as under:

1. ***Religious***: Permanent ghats, more temples, ashrams/maths, public conveniences
2. ***Recreational:*** Parks, water sports, promenades
3. ***Commercial:*** Guest houses, hotels, eateries, haats

Table 8.1: Priority of activities along the riverfront

Activity	Proposals
1.Religious development	Permanent ghats,
	Ashrams and maths
	Spiritual/Yoga centres
	Temples
	Public facilities
2.Recreational development	Parks
	Water sports, water parks
	Boating

	Promenades
3. Commercial	Guest houses/hotels
	Haats/Sunday markets
	Eateries

Source: Primary survey

8.3 PROPOSED STRATEGIES FOR THE DEVELOPMENT OF THE RIVERFRONT

The various strategies have been proposed based on the survey conducted. It is in accordance to the nature of the riverfront and the existing problems. The type of tourism existing at the place has also been taken care of. The various strategies are:

8.3.1 Religious development

Since Allahabad is known for Sangam(the confluence of rivers Yamuna and Ganga) and it attracts lakhs of pilgrims around the world, the riverfront must be developed primarily with a religious point of view.

a) Maths and ashrams must be developed along the ghats.
b) Spiritual and yoga centres can be developed.
c) The bathing ghats can be made permanent.
d) Public facilities like changing rooms, toilets, drinking water supply to be provided on the ghats.
e) The temples existing near the riverfront are as under:

Table 8.2: List of major Temples near Sangam area

Legend	**Location**
Aksheyvat temple	In Fort
Hanuman temple	Near Ganges
Shankar Viman Mandapam	Near Ganges
Bhagwan Dham	Near Ganges
Lakshmi Narayan Temple	Near Ganges
Someswar Mahadev temple	Near Ganges
Chakramahadev temple	Near Ganges
Sankat Mochan temple	Near Ganges
Nagbasuki Temple	Near Ganges
Shivkuti	Near Ganges
Patalpuri temple	Near Ganges

Source:Primary and secondary data

This shows that nearly all the temples are located on the banks of Ganges.So the new temples should be proposed on the banks of Ganges only as the sanctity of Sangam is held in high esteem.

8.3.2 Flood management

The floods and the change of course of the river Ganga every year is an important concern to be addressed.

a) The flood risks as a result of climatic changes will increase with time. So a long term plan for risk management should be prepared.

b) The existing embankment on the Sangam bank must be strengthened and raised and such embankments be constructed on the other ghat areas as well to have a permanent development of the area.

c) The course of the river can be fixed by the construction of embankments.It will thus prevent the new areas being subsequently submerged with the change in the course of the river.

8.3.3 Pollution abatement

The rivers Ganga and Yamuna are used for religious bathing and drinking purposes. So it is very important to control the pollution in the rivers for the health of the people of Allahabad. Pollution in the river is mainly due to the 13 open drains flowing into the river.

a) For the whole city, a sewage and drainage master plan must be prepared and it should be treated before draining into the Ganga and Yamuna rivers.

b) There are no sewer lines in 70% the areas. All such areas must be provided with sewers.

c) Sewage and rain water gets mixed up. Thus the sewage is carried into the river along with storm water without been treated.

8.3.4 Recreational development

There is a recreational aspect of the riverfront other than religious aspect. Both these aspects need to be blended properly for the wholesome development of the area.

a) There is a lack of parks and recreational spaces in Allahabad. Some of the existing parks and their condition is given in the table below:

Table 8.3 : List of major public parks at Allahabad

Name of park	Condition of park	Problems
Alfred park	good	Lack of proper infrastucture
Sumitra Nandan Pant Memorial Children Park	Not good	Near Allahabad University causing lack of law & order
Nehru park	Not good	Lack of proper infrastucture
P.D. Tandon park	Good	Used for political parties
Khusro Bagh	Not good	Pollution due to nearby railway station & bus stand.
Minto Park	Good	Lack of security

Source:Primary and secondary data

Thus, City level parks are needed in Allahabad for recreation. They can be developed near the riverfront.

b) The riverfront can be developed for round the year tourism. The people of Allahabad need some places for leisure activities.Water parks along the riverfront can be developed. Water sports facilities can be developed.

c) Promenades can be developed along the banks of the river for a leisure walk. Sitting spaces can be provided along the riverfront.

d) Eating joints and haats/Sunday markets can be provided for along the area.

Out of all the above stated data, the planning proposals is followed in the forthcoming chapter.

8.4 INFERENCES

The rivers Yamuna and Ganga together constitute a large open space in the city. This area if developed properly can become a prime location and a better tourist destination for the people of Allahabad as well as people from all over the country. The strategy seeks to provide for a blend of religious and recreational development keeping in view the religious sanctity of the Sangam and the refreshing nature of the flowing river.

CHAPTER 9
FINAL CONCLUSIONS

9.1 INTRODUCTION

This chapter deals with the proposals for the comprehensive development of the riverfront rather than a piecemeal development. The proposals have been made based on the strategies given in the previous chapter.

9.2 PROPOSALS FOR THE STUDY ZONE

The riverfront has been divided into 17 zones for the purpose of study. The study zone extends from Yamuna bridge in the western side to the Arail Chhatnag marg on the eastern side and Shastri bridge in the north. A stretch of 200m. width from the river has been taken for the major proposals in this zone.

Table 9.1: PLANNING PROPOSAL FOR THE DEVELOPMENT OF RIVERFRONT

AREA /ZONE	AREA (SQ.M.)	CODI-NG	PURPOSE (PRESENT)	PROPOSAL BY THE GOVT.	EXISTING PROBLEMS	PROPOSALS
1.Yamuna Bridge to Boat club	120480	AB	Boating	Boating,canoeing	Growth of slums in the area	Provide for Sunday market and haats in place of slums and make boat club more efficient.
2. Boat club to Malviya ghat	124800	BC	Fishing	None specified	No proper ghat existing	Provide for recreational facilities
3. Malviya Ghat to Mankameshwar ghat	72000	CD	Religious activities	None specified	The ghats are not properly developed	Provide for ashrams/spiritua centre
4. Mankamesh-war ghat to Loharwa Ghat	42480	DE	Fishing	None specified	The ghats are not properly developed	Provide for promenades and recreational facilities
5. Loharwa Ghat to Nehru Ghat	29520	EF	Fishing	None specified	The ghats are not properly developed	Provide for water park
6. Nehru Ghat to Saraswati Ghat	48720	FG	Recreation, boating	Pucca ghats,Park, eateries, boating	Make it more accessible to public.	Provide for maintenance of the ghat

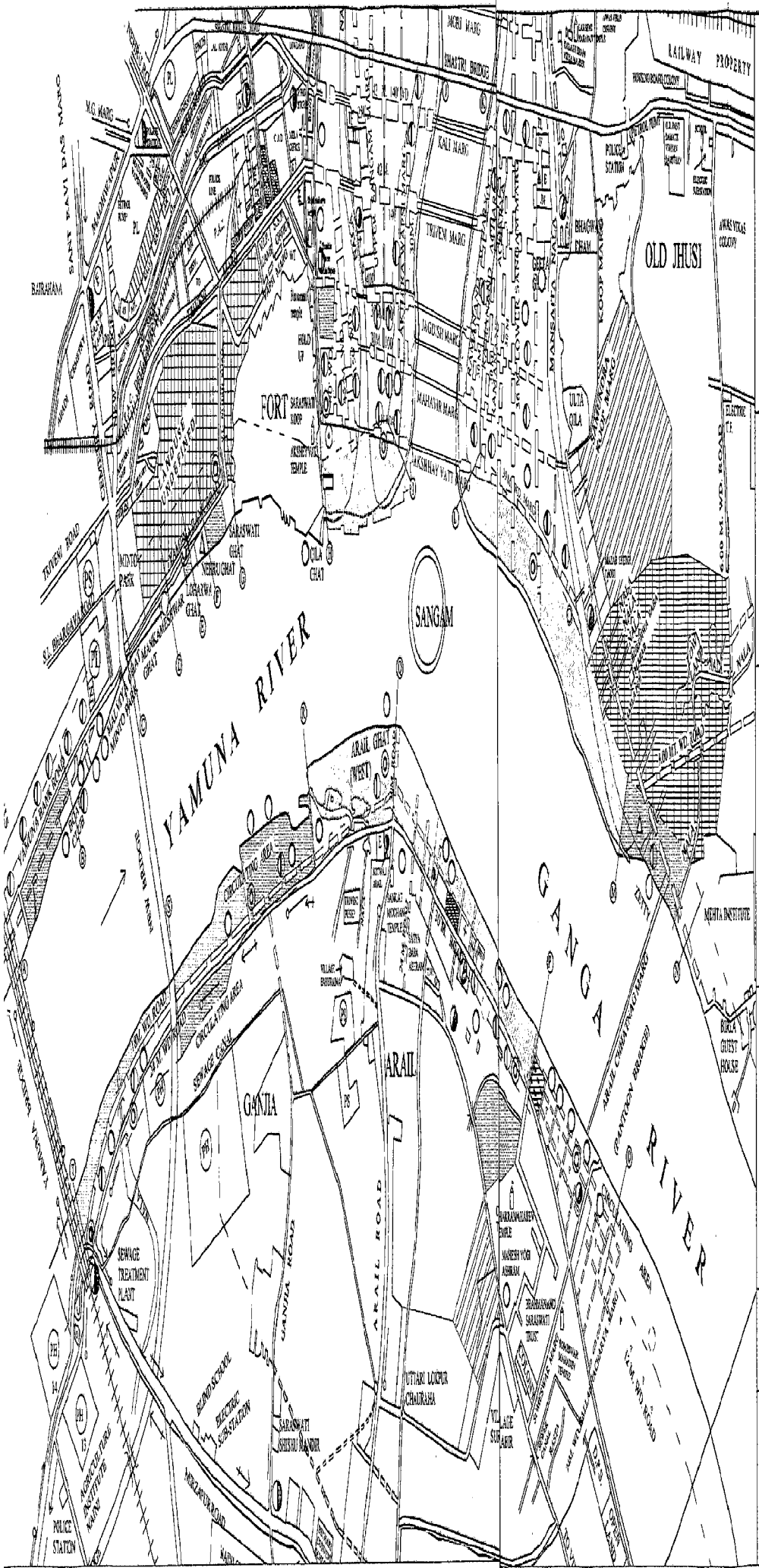
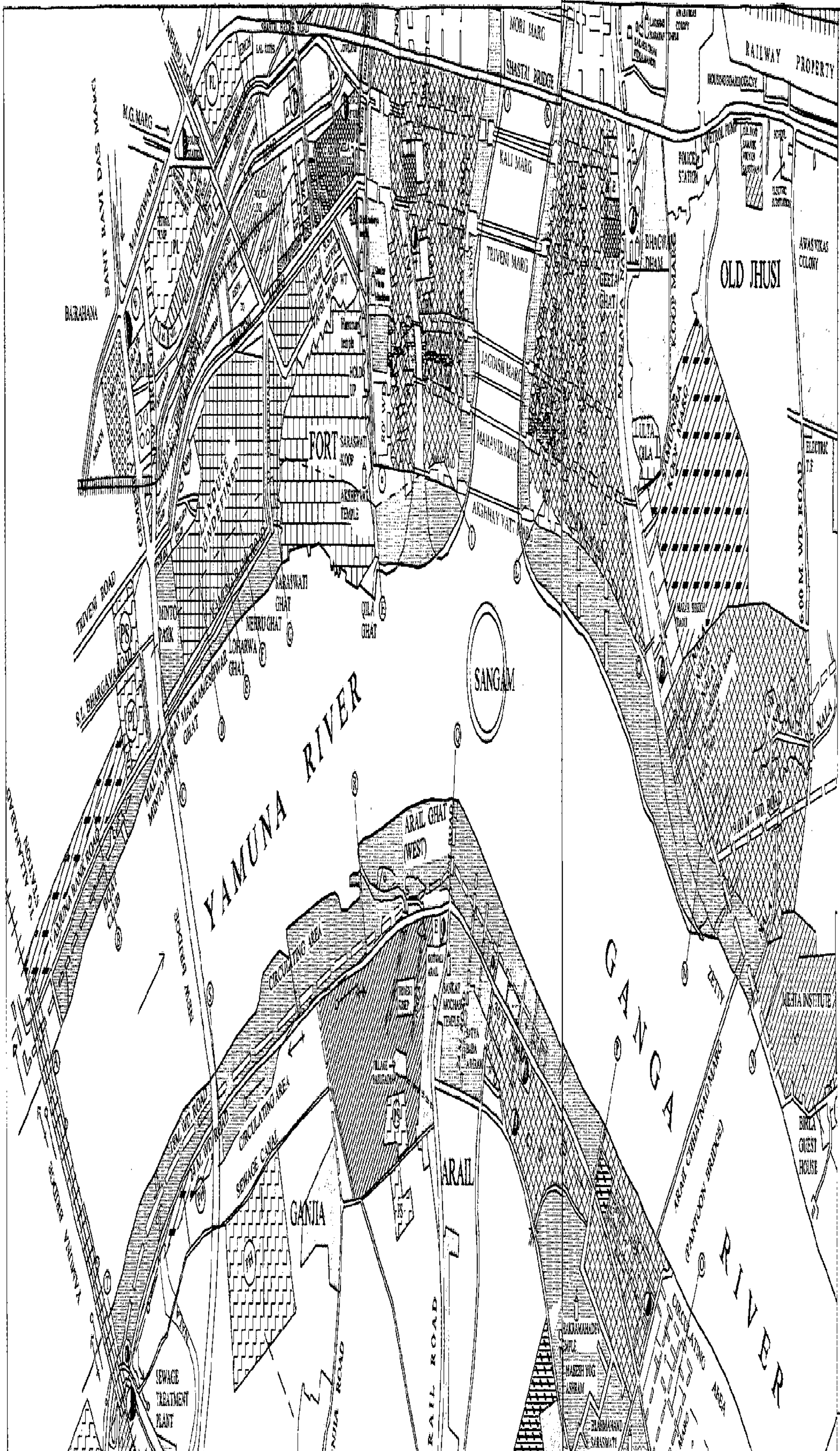


Fig.9.a): PROPOSED ACTIVITY PLAN OF THE RIVERFRONT

RIVERFRONT DEVELOPMENT OF ALLAHABAD-'THE KUMBH CITY'



LAND USE	AREA(in hectares)	LAND USE	AREA(in hectares)
RESIDENTIAL	140.9	LANDUSE UNDEFINED	39.65
COMMERCIAL	54.21	FORT AREA	38.66
ASHRAM/TEMPLE COMPLEX	56.64	CEMETRY	5.94
INSTITUTIONAL	23.9	PARKING	47.3
PUBLIC UTILITY	0.92	RECREATIONAL	19.26
PARKS/OPEN SPACES	32.73	WILD VEGETATIVE COVER	23.56
SLUMS REHABILITATION	11.03		
HEALTH	4.98		
KUMBH MELA GROUND	282.25		
MELA BOUNDARY			
GHATS	83.26		
GOVERNMENT ADMINISTRATIVE DEPT.	9.89		
POLICE LINE	3.94		
P.A.C.	12.78		

N

NOTE: Area within the red dotted line shows the study/riverfront stretch and with a depth of 200m.

Fig.9.b): PROPOSED LANDUSE PLAN OF THE RIVERFRONT

RIVERFRONT DEVELOPMENT OF ALLAHABAD-'THE KUMBH CITY'

AREA /ZONE	AREA (SQ.M.)	CODI-NG	PURPOSE (PRESENT)	PROPOSAL BY THE GOVT.	EXISTING PROBLEMS	PROPOSALS
7. Saraswati Ghat to Qila Ghat	156960	GH	Bathing at Qila ghat,boating	The ghat has been made permanent	The ghat is very narrow.	To make the ghat wide and provide for light and sound shows.
8. Qila Ghat to the Sangam bank	139200	HI	Boating, bathing	None specified	The ghat is not permanent.	To make the ghats permanent and steps to be added
9. Sangam bank to Shastri bridge(City side)	203520	IJ	Boating, bathing	None specified	The ghat is not permanent.	To make the ghats permanent and more pedestrian bridges should be constructed t connect city side to jhusi side.
10. Shastri bridge to the sangam bank(Jhusi side)	208800	KL	Boating, bathing	None specified	The ghat is not permanent.	To make the ghats permanent and temples made.
11. Ganga bank(Jhusi side)	319680	LM	Boating, bathing	None specified	The ghat is not permanent.	To make the ghats permanent and provide for eateries and temporary shops.
12. Ganga bank upto Mehta institute(Jhusi side)	121200	MN	Boating	Water jetties	The ghat is undeveloped.	Provision of water sports and water park.
13. Arail Ghat	160080	OP	Fishing	None specified	The ghat is undeveloped and lack of security.	Provision of steps ,boating facilities and spiritual/yoga centres.
14. Arail Ghat(upto Sangam area)	285600	PQ	Fishing,boating	None specified	The ghat is undeveloped and lack of security.	To make the ghats permanent and steps to be added,provide for bathing facilities.
15. Arail Ghat	136800	QR	Fishing,boating	None specified	The ghat is undeveloped and lack of security.	To make the ghats permanent and steps to be added,provide for bathing facilities.
16. Arail Ghat(upto New Bridge)	247200	RS	Fishing,boating	None specified	The ghat is undeveloped and lack of security.	Provision of promenades,recreationa parks,boating facilities.

17. Arail Ghat(New Bridge to Yamuna bridge)	202320	ST	Fishing,boating	None specified	The ghat is undeveloped and lack of security.	Provision of promenades,Haat markets.

[Based on Primary Survey conducted by the Author [Nov. – Jan. 2008]

9.3 CONCLUSION

The proposals seek to maintain an ecological balance as well as provide for the facilities for the development of the riverfront. The river has been developed as a major religious destination with some recreational and commercial activities. Also the natural assets along the river have been preserved. The framework of new development will ensure physical and environmental needs, will also envisage the modern and efficient amenities to all the citizens.

With the passage of time, as the cities will become more crowded, the riverfronts will be the only open spaces for refreshment. Thus steps must be taken to preserve our rivers which are the lifeline of our cities.

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