

# A compendium of RIVER MANAGEMENT PLANS

From Managing River Basins to River Specific Projects





A COMPENDIUM OF  
RIVER MANAGEMENT PLANS





An aerial photograph of a city, likely Paris, showing a river (the Seine) winding through the urban landscape. The buildings are dense and multi-story, with a mix of architectural styles. The sky is overcast with soft, diffused light.

## Title

A Compendium of River Management Plans

## Publisher

National Institute of Urban Affairs (NIUA), Ministry of Housing & Urban Affairs, GoI  
National Mission for Clean Ganga (NMCG), Ministry of Jal Shakti, GoI

## Acknowledgements

Vasudha Sharma, Rahul Sachdeva, Ishleen Kaur, Nikita Madan,  
Banibrata Choudhury, Jyoti Verma, Lovlesh Sharma, Sahil Bhardwaj, Uday Bhonde, Victor R. Shinde,  
Vishakha Jha (NIUA team)

## Disclaimer

This document is a compilation of various works. Original references may be studied along with this document.

Neither the authors nor NIUA or NMCG accept any legal liability for the accuracy of inferences drawn from the material contained herein or for any consequences arising from the use of this material.

Material from this publication may be reproduced with due acknowledgement to NIUA and NMCG.

## Graphics, Illustrations and Images

The illustrations within the document have been picked from the original citations.

## Year of Publication

2022





# PREFACE

Water resources act as the lifeline for human habitation. People have been living close to rivers, lakes, wetlands and deltas for many centuries. Most of the early civilizations emerged on the banks of some of the world's most iconic rivers, which offer a multitude of services such as water supply for farms and cities, fisheries to provide food for communities, energy to power economies, flood attenuation for downstream development, cultural and leisure amusement for people, spiritual upliftment for believers and a habitat for a diversity of plants and animals. Unfortunately, the expectations from rivers have exceeded their natural capabilities, thus resulting in over-abstraction, pollution, alien infestation, floodplain alteration and habitat destruction. These failures are usually the consequences of poor decision-making, insufficient management and inappropriate planning.

The first step towards river rejuvenation is creating a value for the rivers among various stakeholders. One way to do so would be to adopt both, top-down (basin to site level) and bottom-up (site to basin level) approaches for planning the river basins as a whole, so as to ensure that adequate provisions to protect and manage the rivers are taken consistently over time. This knowledge product reviews various river management plans, with a view to understand the treatment meted out to rivers in the entire planning process. There are several implications of this knowledge product. First, it appraises the readers of different tools and instruments that various management plans have used to create a value for the river in the planning process itself. Second, it highlights the gaps and key areas of concern that plans need to address, in order to holistically manage a river within their limits. Third, it provides a glimpse into some innovative planning practices and initiatives to enhance river management.

This Knowledge Product will provide readers with enough insights to support and promulgate sustainable and environmentally safe river management.







## ABOUT THE PRODUCT

Throughout the history of humankind, rivers have been the lifeline of all civilizations. The trend continues even today. However, because of contemporary socio-economic development, rivers have been facing growing threats on several fronts - unsustainable withdrawals, pollution, and habitat deterioration, to name a few. One of the important drivers of deterioration of river health is the rapid pace of unplanned urbanization.

Given its significance for sustaining human civilizations, improving river health is gaining increasing international prominence, and becoming a prime mandate of governments all over the world, including India. The issues pertaining to rivers are so prominent that the 2030 Developmental Agenda also emphasizes on '*river conservation and restoration*' under the *Sustainable Development Goal 6 (SDG-6)*. The thrust is on inculcating a sense of responsible urban development, that extends respect to the rivers.

Across the globe, there have been several noteworthy attempts to revive polluted rivers. An assessment of such attempts can provide an opportunity to adopt and replicate them. This knowledge product tries to capture some of the best practices adopted for effective river management across the globe, while emphasising the need of comprehensive river management for addressing the issues faced by river cities in India.

The case examples incorporated in this Knowledge Product highlight the globally prevalent river management practices, with a focus on key strategies for - ecological restoration of the river (Environment); enabling the re-connect of people with the river (Social) and; boosting the livelihoods of people associated with river activities (Economy).





# CONTENTS



01

02

03

06

09

11

River Management Plans

Introduction to River  
Management Plans

Scales of River  
Management Plans

Case Studies

Key to read

Parameters for Assessment

Case Studies Assessment  
(Compiled)



15

17

19

21

23

25

27

29

31

33

36

38

Overview of River Management Plans

Ganga River, India

Brantas River, Indonesia

Thames River, London

Trinity River, US

Parramatta River, Australia

White River, Indianapolis

Chicago River, US

Los Angeles River, US

The Four Rivers  
Restoration, South Korea

Sabarmati River, India

Way Forward

References



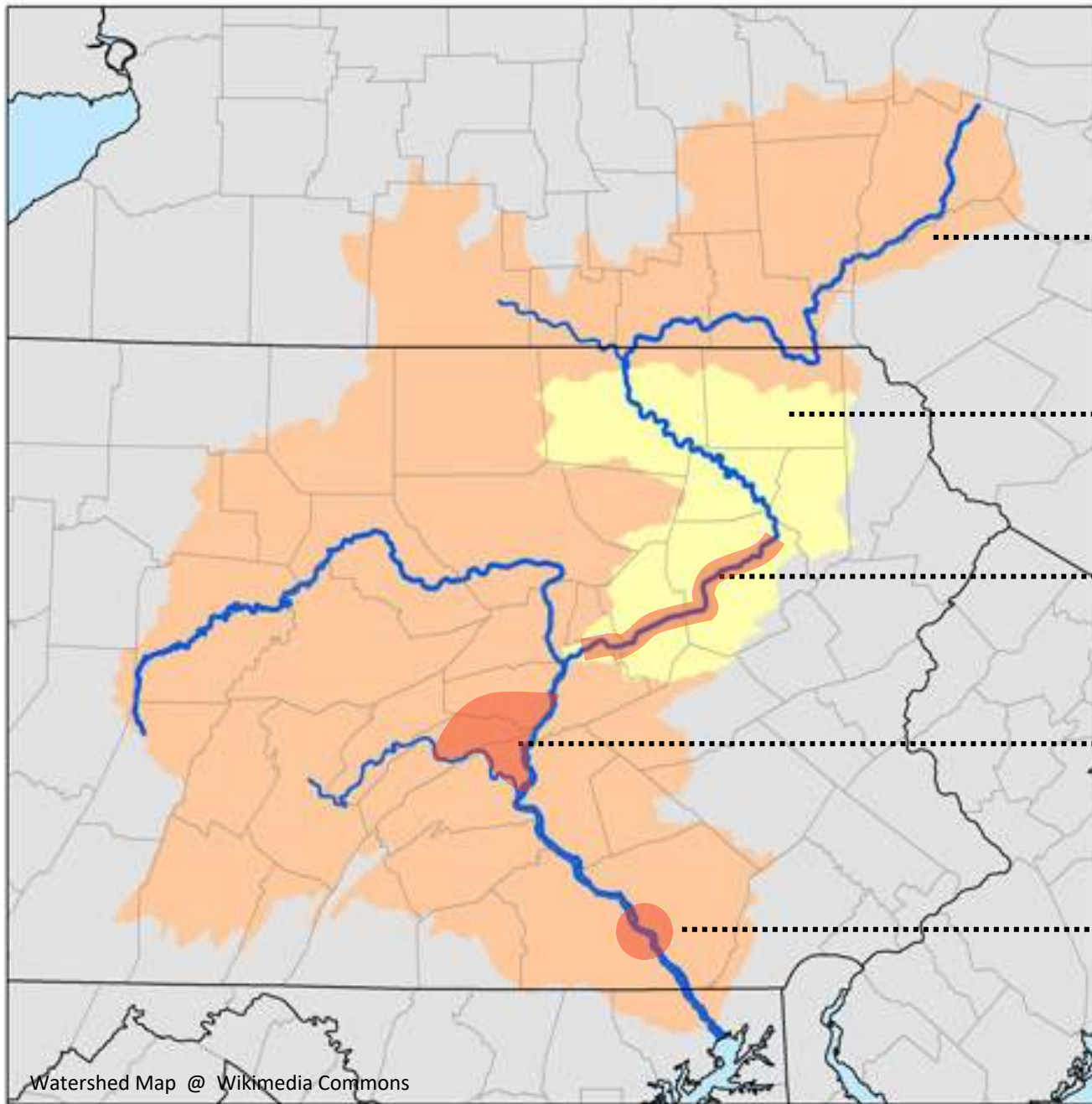
Managing river basins and their watersheds is one of the key focus areas of planning for Integrated Water Resource Management (IWRM). River management is a process that primarily involves conservation and development of water, adjoining land and related resources, within a river basin/ catchment/ or precinct area. The main goal of such management is to maximize the economic and social benefits derived from water resources in a sustainable manner, while preserving or restoring these freshwater ecosystems.

**The key elements of a successful river management plan include:**

1. A long-term vision for the river, agreeable in-principle by all major stakeholders.
2. Convergence of existing inter-sectoral policies, strategies, programs and projects (such as agriculture, industry, urban development, navigation, fisheries), towards river-sensitive development.
3. Scientific approach that blends hard and soft measures for sustainable river management.
4. Strategic decision-making at the river basin scale, which guides actions at sub-basin or local levels.
5. Participatory approach including all relevant stakeholders (government, academia, private sector, and civil society groups, eco-groups, NGOs) pursuing well-informed and transparent planning and decision-making.
6. A living and dynamic document with provisions to incorporate new requirements and learnings, as per the changes occurring in the natural ecosystem.

With the growing concerns of urbanization affecting rivers, River Management Plans are being prepared across the globe at various levels viz. river catchment, basin, or precinct level. However, currently in India, there exists a significant gap in river-sensitive planning. This essentially means preparing cities for treating the river as an asset and ensure that developmental activities in the urban setup are not detrimental to the river. Thus, River management plans become even more essential for promoting such development in future.

## Varying Scales of River Management Plans



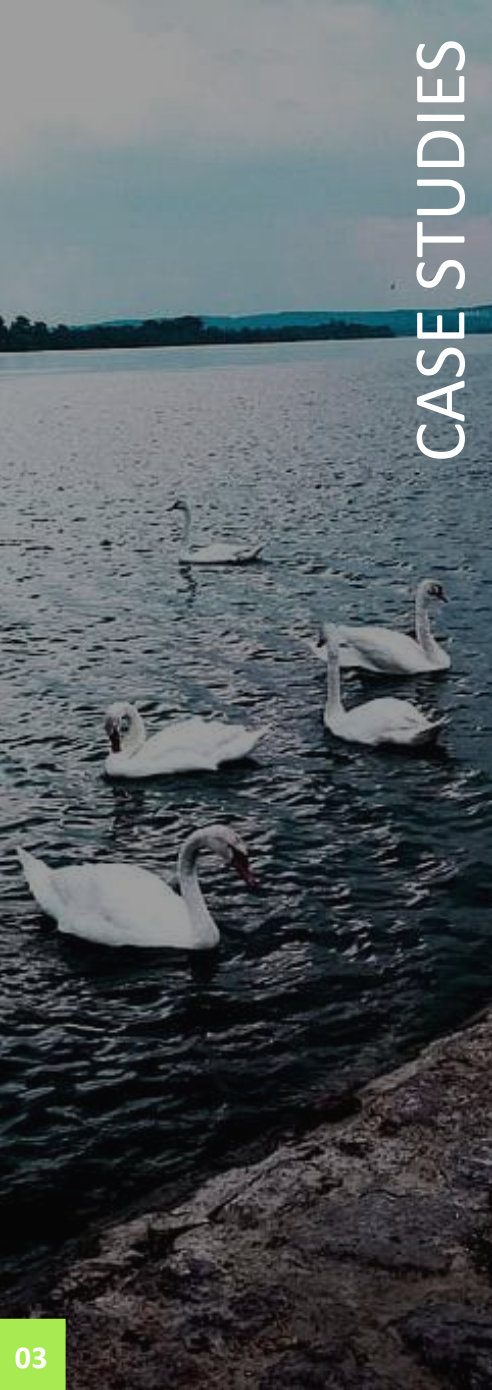
River Basin Plan

Sub-catchment Plan

River Corridor Plan

River Precinct Plan

Project Specific Plan



CASE STUDIES



LA River

USA

Chicago River

White River

Trinity River






UK  
Thames River

Rhine River  
Germany





### Hierarchy of Plans

-  RIVER BASIN MANAGEMENT PLAN
-  RIVER CATCHMENT MANAGEMENT PLAN
-  RIVER CORRIDOR MANAGEMENT PLAN
-  RIVER PRECINCT MANAGEMENT PLAN
-  PROJECT SPECIFIC RIVER PLAN



The next sections in the Knowledge Product are a collation of different case examples of varying scales that have been assessed on three broad parameters and are further divided into sub-indicators. The three parameters of assessment are:

- **Key strategies** incorporated/ applied in the Plan, whether it's a Project Plan or a Basin level Plan
- **Implementation framework** that has been adopted by the Plan towards identifying the core issues, including pertinent aspects of finance, governance and monitoring.
- **Impact Assessment** either post Plan implementation or the impacts proposed and projected by the Plan

The sub-indicators further assess these cases based on their adoption of systems approach, the robustness of the proposed implementation framework and the holistic ecological, economic and social impacts of these Plans.

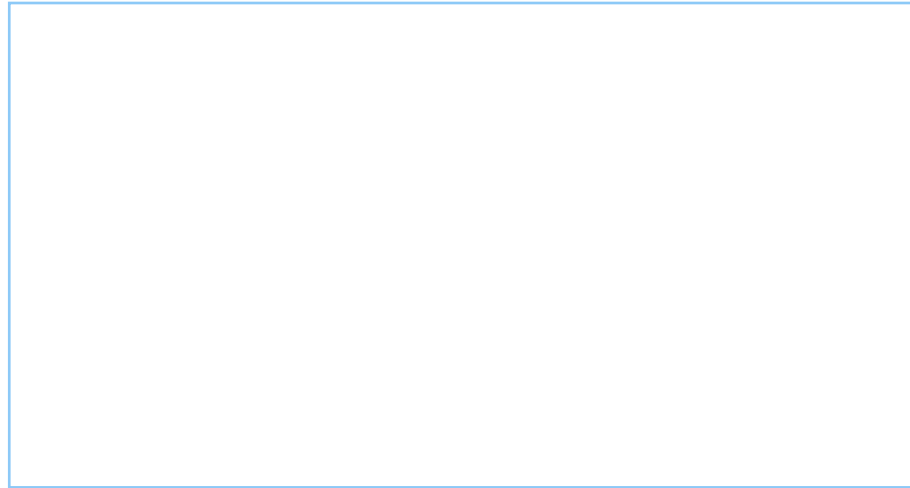
A collection of 10 case studies have been chosen from among 17 case examples spread across various global regions based on a Rapid Assessment of their effectiveness in terms of the key strategies, implementation framework and Impact Assessment. An effort has been made towards collating diverse cases of different scales, from Basin to Project level to understand the nuanced ways in which these Plans can intervene.

The following section elaborates on the structure adopted for the case studies providing different heads under which the information has been collected and organized.

# CASE EXAMPLE: River name/ Country

**VISION**

**PHOTOS (PAST and PRESENT)**



*Basin Picture*

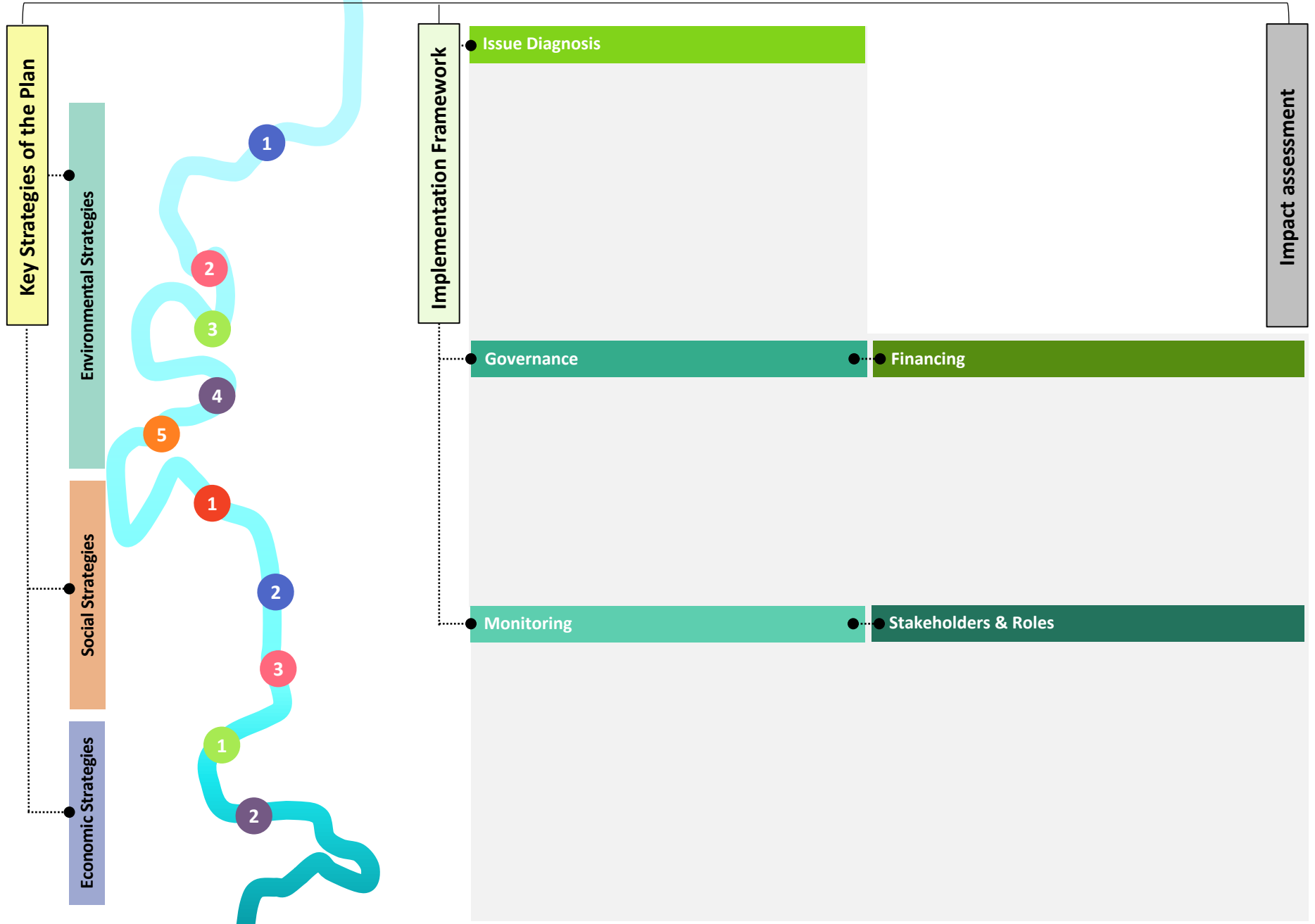
**HIERARCHY OF PLAN**

**DOCUMENT NAME**

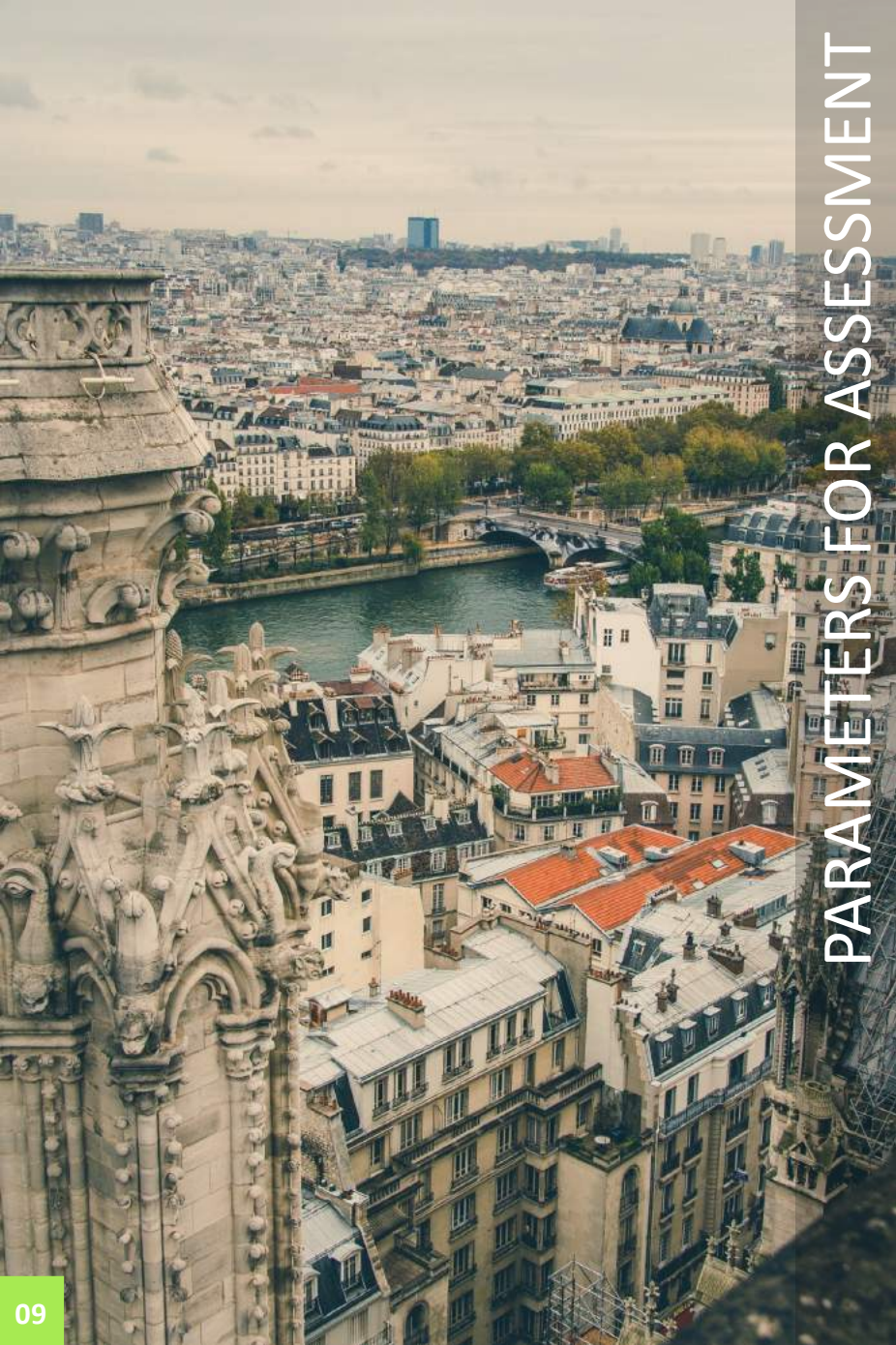
**RIVER BASIN PROFILE**

**CORE ISSUES**

# STRUCTURE FOR PLAN ASSESSMENT OF SELECT CASE STUDIES



Plan Assessment		
ENVIRONMENTAL	SOCIAL	ECONOMIC
<b>STRATEGIES</b>		
ENVIRONMENTAL	SOCIAL	ECONOMIC
<b>IMPLEMENTATION FRAMEWORK</b>		
ISSUE DIAGNOSIS	GOVERNANCE	FINANCING
MONITORING	ENVIRONMENTAL	SOCIAL
<b>IMPACT ASSESSMENT</b>		
Mentioned but not in detail	Due consideration given	Absent



# PARAMETERS FOR ASSESSMENT



## KEY STRATEGIES OF THE PLAN



### ENVIRONMENTAL

Strategies pertaining to ecological restoration of the river and its surroundings



### SOCIAL

Strategies pertaining to fostering community engagement and re-establishing connect with the river



### ECONOMIC

Strategies pertaining to boost the economy generated from riverine activities, like livelihood opportunities, real estate growth, etc.



## IMPLEMENTATION FRAMEWORK



### ISSUE DIAGNOSIS

Methodology for conducting problem identification and impact studies



### FINANCING

Methods used for raising finances for plan implementation



### GOVERNANCE

Plan formulation and implementation framework



### MONITORING

Techniques and parameters adopted for monitoring of the Plan



## IMPACT ASSESSMENT



### ENVIRONMENTAL

Environmental benefits observed as a result of the plan



### SOCIAL

Social impact of the plan, esp. over the quality of life



### ECONOMIC

Economic returns achieved as a result of the plan

# CASE STUDIES ASSESSMENT

		Key strategies of plan			
	CASE STUDY	PLAN NAME	ENVIRONMENTAL	SOCIAL	ECONOMIC
Australia	Parramatta, Sydney	Parramatta River Master Plan, 2020	Green	Green	Green
	Fitzroy River	Fitzroy River Catchment Management Plan, 2017	Green	Green	Yellow
	Georges River	George's River Precinct Plan, 2017	Green	Green	Yellow
	Brisbane River	Brisbane River Master Plan, 2019	Green	Green	Yellow
America	Los Angeles, US	LA River Revitalization Plan, 2007	Green	Green	Green
	Trinity River, Texas	Confluence : The Trinity River Strategic Master Plan, 2030	Green	Green	Green
	White River, Indianapolis	White River Master Plan, 2019	Green	Green	Green
	Chicago River	Chicago River Corridor Development Plan, 2012	Green	Green	Green
Europe	Thames River, London	Thames River Basin District Plan, 2021	Green	Green	Green
	Anglian River, UK	Anglian River Basin District Plan, 2021	Green	Green	Green
	Rhine River, Germany	Internationally Coordinated Management Plan 2015 for Rhine River Basin District	Green	Green	Yellow
Asia	Brantas River, Indonesia	Brantas River Basin Development Plan, 2020	Green	Green	Yellow
	South Korea	The 4 River Restoration Master Plan, 2012	Green	Green	Green
	Singapore River	<i>Singapore River Development Plan, 2012</i>	Green	Green	Green
	Brahmaputra River, India	<i>Brahmaputra River Master Plan</i>	Green	Green	Green
	Sabarmati River, India	<i>Sabarmati Riverfront Development Master Plan, 2019</i>	Green	Green	Green
	Ganga River, India	<i>Ganga River Basin Management Plan, 2015</i>	Green	Green	Green



### Implementation framework

GOVERNANCE	MONITORING	FINANCING
Green	Green	Yellow
Green	Yellow	Yellow
Green	Yellow	Yellow
Yellow	Yellow	Red
Green	Green	Yellow
Green	Green	Green
Yellow	Green	Yellow
Green	Yellow	Green
Green	Green	Yellow
Green	Green	Green
Green	Green	Yellow
Yellow	Green	Yellow
Green	Green	Green
Green	Green	Green
Green	Red	Yellow
Green	Yellow	Green
Green	Green	Green

### Impact assessment

SOCIAL	ECONOMIC	ENVIRONMENTAL
Green	Green	Green
Green	Yellow	Green
Yellow	Yellow	Green
Yellow	Green	Green
Green	Green	Green
Green	Green	Green
Green	Green	Green
Green	Green	Green
Green	Green	Green
Green	Green	Green
Green	Green	Green
Green	Green	Green
Green	Green	Green
Green	Green	Green
Yellow	Yellow	Yellow
Green	Green	Green
Green	Green	Green
Green	Green	Green
Green	Yellow	Green

#### LEGEND

- Due consideration given
- Mentioned, but not in detail
- Absent





# Ganga River, India

## VISION

To restore the ecological balance of the national river Ganga and provide an enabling environment for endemic flora, fauna and microorganisms to thrive in the Ganga river network.



Ganga River Basin

## HIERARCHY OF PLAN

Basin Level

## DOCUMENT NAME

Ganga River Basin Management Plan, 2015

## RIVER BASIN PROFILE

Location: **India**  
Length: **2525 km**  
Basin Area: **8,61,404 km<sup>2</sup>**  
Population: **48.5 Crores**  
Density: **563 persons/km<sup>2</sup>**  
Urbanization Rate: **30%**

## CORE ISSUES

- Water pollution
- Flooding
- Drought
- Fragmented management
- Deteriorating groundwater levels



Pollution and Flooding in River Ganga

PAST

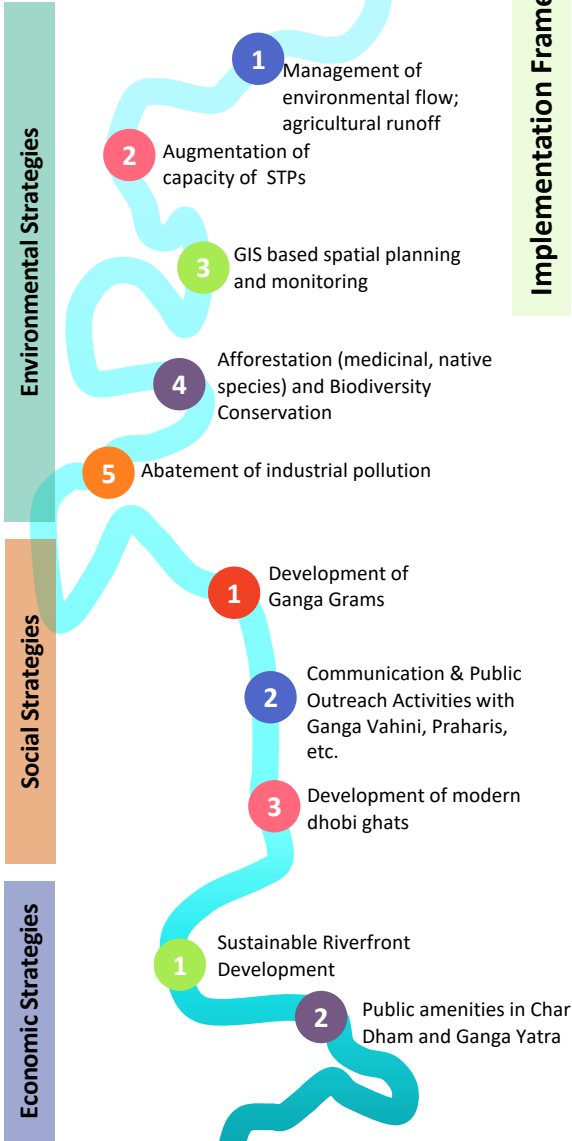
## PRESENT



Cleaner river, protected with embankments



# Key Strategies of the Plan



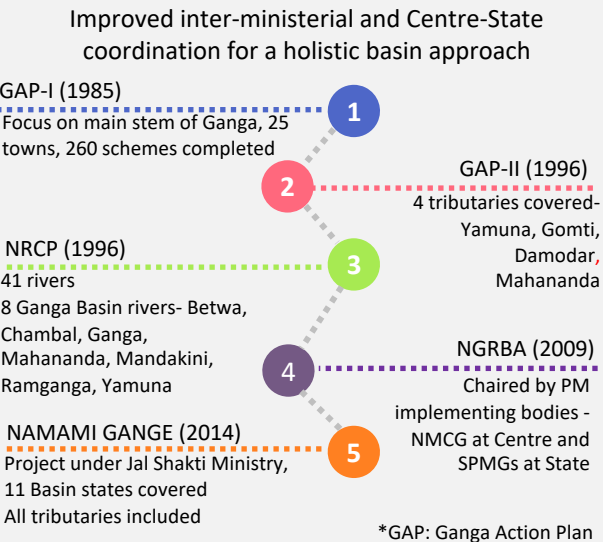
## Implementation Framework

### Issue Diagnosis

Carried out by Deltares and its partners AECOM India and Future Water in cooperation with GoI, for:

- **Scenario and strategy assessment**
- **Environmental flow assessment**
- **Groundwater surface water interaction assessment**

### Governance



### Monitoring

- National Ganga River Basin Authority (NGRBA) is responsible for planning, financing, monitoring & coordination.
- Environmental Monitoring & Impact Assessment Wing is responsible to -
  - **Conduct regular/ random field measurement of environment related data within the basin**
  - **Monitor/ coordinate developmental and infrastructure projects**
  - **Conduct impact assessment of existing practices and infrastructure within the basin**

### Expected Impacts

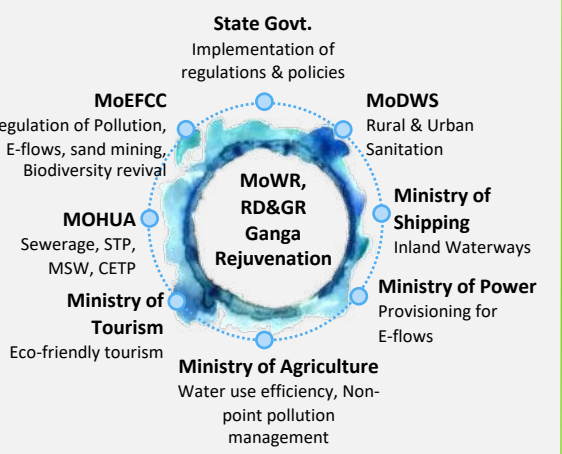
- Environmental**
- Improved water quality
  - Sustained environmental flow
  - Restored aquatic species
  - Increased forest cover
- Social**
- Improved livelihood opportunities

### Financing

International banks and Central Government, including

- Government of India (GoI)
- World Bank
- Japanese International Cooperation Agency (JICA)

### Stakeholders & Roles



## Impact assessment

Plan Assessment

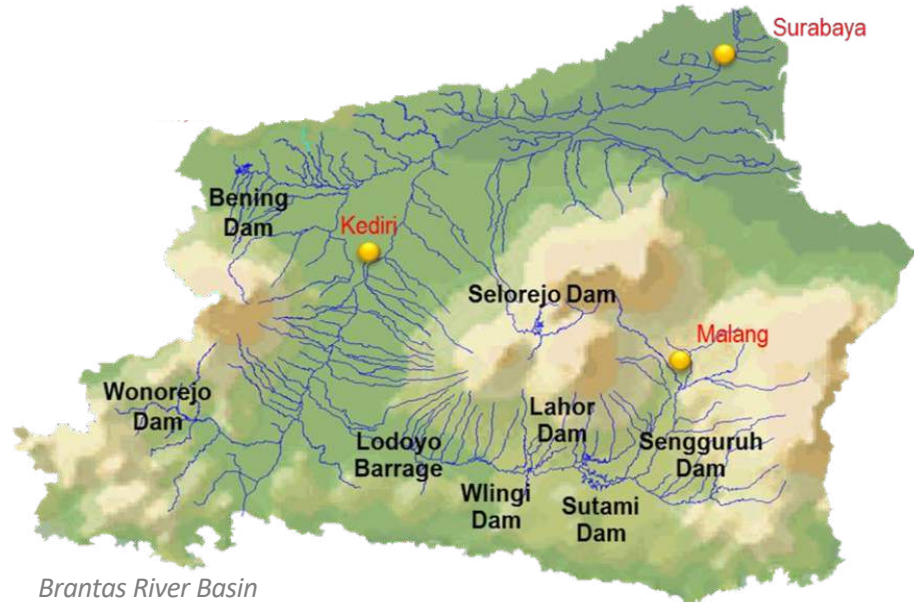
STRATEGIES	ENVIRONMENTAL	IMPLEMENTATION FRAMEWORK	FINANCING	IMPACT ASSESSMENT	ENVIRONMENTAL
	SOCIAL		GOVERNANCE		SOCIAL
	ECONOMIC		ISSUE DIAGNOSIS		ECONOMIC
Due consideration given		Mentioned but not in detail		Absent	

# Brantas River, Indonesia



## VISION

To raise up social life and prosperity in economy, social and culture of the society within the basin.



Brantas River Basin

## HIERARCHY OF PLAN

Basin Level

## DOCUMENT NAME

Brantas River Basin Development Plan, 2020

## RIVER BASIN PROFILE

**Location:** Java Island, Indonesia

**Length:** 320 km

**Catchment Area:** 11,800 sq. km.

**Population:** 16 million (2005)

**Density:** 1356 persons/km<sup>2</sup>

## CORE ISSUES

- Water pollution
- Flooding
- Drought
- Erosion and sedimentation
- Destruction of aquatic biota



Waste disposal in the river and frequent flooding



PAST

## PRESENT



Massive Infrastructure development along with investment in early flood warning and monitoring systems



# Key Strategies of the Plan

## Environmental Strategies



## Social Strategies



## Implementation Framework

### Issue Diagnosis

- Social and Environmental Impact Assessment conducted in detail
- Brantas River Forum formed - 50% community participation required in all water management planning, as per the Water Law

### Governance

#### Decentralised approach



### Monitoring

- Established community driven monitoring system
- Stakeholder reporting, water quality monitoring and routine inspection are carried out
- A clean monitoring programme with government, NGOs, local communities and media, applying social pressure on industries for pollution control

## Expected Impacts

### Environmental

- Improved water quality
- Flood protection for 50 years

### Social

- Community interests addressed
- Improved quality of living
- Improved livelihood options

### Economic

- 1 billion kwh energy produced/year
- Reduction in flood induced loss

## Financing

International banks and Central Government, including

- Japanese Reparation (JR)
- Overseas Economics Cooperation Fund of Japan (OECF)
- Government of Indonesia (GOI)
- Asian Development Bank (ADB)
- International Bank for Reconstruction and Development (IBRD)

## Stakeholders & Roles



## Impact assessment

Plan Assessment

Due consideration given (Green box), Mentioned but not in detail (Yellow box), Absent (Red box)

### STRATEGIES

ENVIRONMENTAL, SOCIAL, ECONOMIC

### IMPLEMENTATION FRAMEWORK

GOVERNANCE, FINANCING, MONITORING

### IMPACT ASSESSMENT

ENVIRONMENTAL, SOCIAL, ECONOMIC

# Thames River, UK



## VISION

Protecting and enhancing the benefits provided by the water environment.



Thames River Basin

### HIERARCHY OF PLAN

Basin Level

### RIVER BASIN PROFILE

Location: **London, UK**  
Length: **200 miles**  
Catchment Area: **16,200sq.km.**  
Population: **1.5 Crore**  
Density: **926 persons/sq.km**  
Urbanisation Rate: **20% (approx.)**

### DOCUMENT NAME

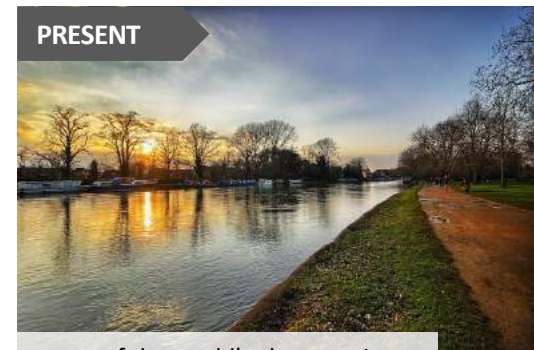
Thames River Basin District  
Management Plan, 2012

### CORE ISSUES

- Storm water pollution
- Plastic waste
- Flooding
- Sewage influences
- Direct industrial discharge
- Physical modification
- Invasive non-native species



PAST



to one of the world's cleanest rivers





# Key Strategies of the Plan

## Environmental Strategies

- 1 Delineation of protected areas in the district
- 2 Wetland creation and coastal re-alignment
- 3 Addressing pollution via Urban Waste Water Treatment Directive
- 4 Incorporation of green-blue infrastructure into regeneration
- 5 Strategy to tackle non-native species
- 6 Flood Risk Management
- 7 Mitigate point-source pollution/ impacts on receptors

## Social Strategies

- 1 Government funded improvement by local partnerships
- 2 Major governance reforms- public participation

## Economic Strategies

- 1 Riverfront Development

## Implementation Framework

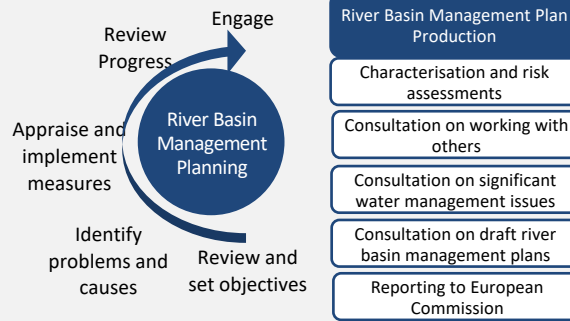
### Issue Diagnosis

Social, Environment & Economic Impact Assessment conducted with features like:

- Social and cultural cohesion (events)
- Digital platform
- Community Engagement Programmes
- Thames 21 River Keeper Network
- Full cost-benefit analysis, with business cases

### Governance

District Liaison Panel with Catchment Group partnerships.



### Monitoring

Periodical reporting of progress as per UK Common Standards Monitoring Guidance (CSMG).

Extensive monitoring programmes that assess on the basis of-

- Status or risks facing protected areas
- Ecological status + individual status of quality elements
- Chemical status + individual status of quality elements
- Annual change in status of each ecological element

## Expected Impacts

### Environmental

- Improved water quality
- Healthy ecosystem- 125 species of fish, up from almost none in 1950s

### Social

- Community Interests addressed
- Improved quality of living
- Improved livelihood

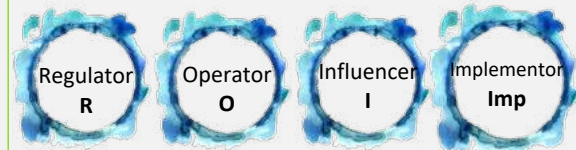
### Economic

- Increased navigation by River (4.7 million tourists visit Thames annually)
- Returns from infrastructure development

## Financing

- Countryside Stewardship Scheme
- Catchment Partnership Action Fund (CPAF)
- Environment Agency's Environment Programme
- Water Metering, Polluter Pays Principle
- Funding through Local Partnerships (Community driven)

## Stakeholders & Roles



- Central government departments – R, I
- Environment Agency – R, O, I, Imp
- Natural England - R, O, I, Imp
- Marine Management Organisation - R
- Internal drainage boards - R, O, I, Imp
- Local government – R, O, I, Imp
- Navigation - R, O, I, Imp
- Forestry Commission - O, I, Imp
- Highways England & Network Rail - O, I
- NGOs - O, I, Imp
- Marine Management Organisation - I

## Impact assessment

Plan Assessment

Absent

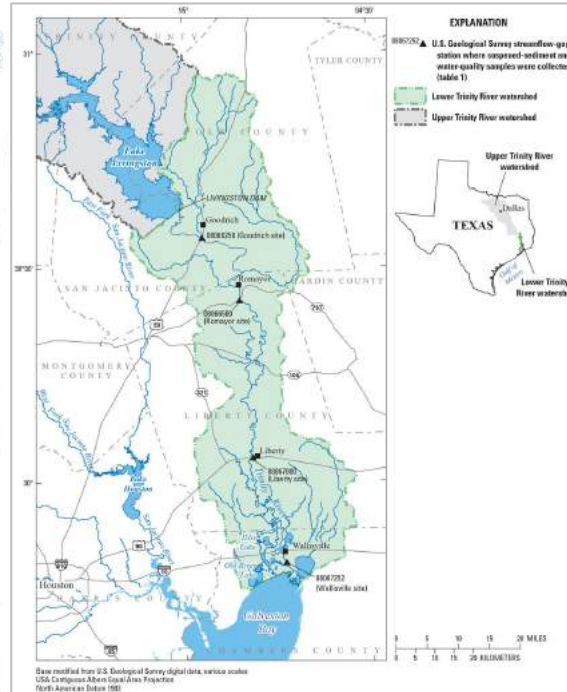
Mentioned but not in detail

Due consideration given

# Trinity River, US



**VISION**  
The Trinity River is integral to a robust economy for Fort Worth and the Tarrant County region. The lifeblood of our environment that seamlessly interweaves our natural spaces and urban places. The centrepiece of our community where people come together to socialize, recreate, and play.



Trinity River Basin, USGS

**HIERARCHY OF PLAN**  
Basin Level

**RIVER BASIN PROFILE**  
Location: **Dallas, Texas**  
Length: **710 miles**  
Basin Area: **40,380 km<sup>2</sup>**  
Population: **80 lakhs (2011)**

**DOCUMENT NAME**  
Confluence- The Trinity River Strategic Master Plan, 2030

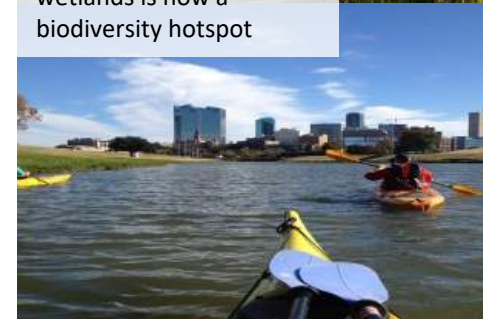
- CORE ISSUES**
- Storm water pollution
  - Flooding
  - Sewerage influences
  - Physical modification of river corridor



PAST

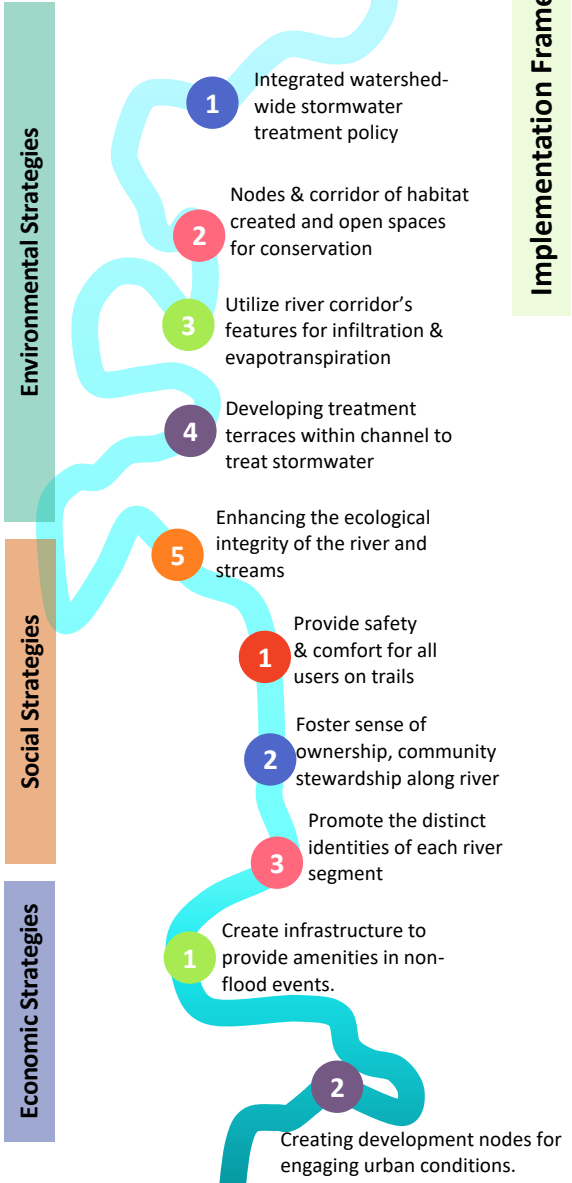


The river with its seasonal wetlands is now a biodiversity hotspot



PRESENT

# Key Strategies of the Plan



## Implementation Framework

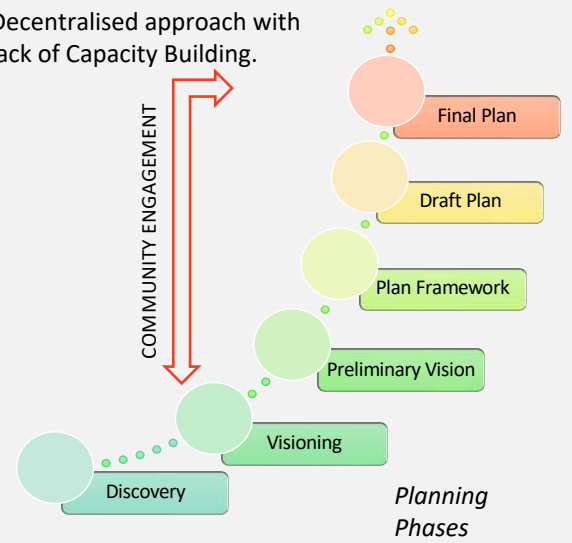
### Issue Diagnosis

Social Impact Assessment conducted in detail via:

- Focus Group Discussions
- Pop-up Workshops, Annual Confluence events

### Governance

Decentralised approach with lack of Capacity Building.



### Monitoring

Periodical reporting by Streams & Valleys Organisation, by managing/ monitoring plan progress, leading interagency communication, facilitating project prioritization & tracking, and building community leadership & involvement (rigorous science-based monitoring & analysis programme).

### Expected Impacts

- Environmental**
- Improved water quality
  - Healthy ecosystem: Habitat restoration of salmon, steelhead, other wildlife by restoring to a healthy, functioning river
- Social**
- Community interests and leadership
  - Improved quality of living
- Economic**
- Reduction in flood mitigation costs
  - Local employment creation
  - Infrastructure creation

### Financing

- Land + development-based funding
- Public/ Municipal Improvement Districts
  - Tax Increment Financing
  - Connections with New Development

### Stakeholders & Roles



## Impact assessment

Plan Assessment

Due consideration given

Mentioned but not in detail

Absent

**STRATEGIES**

- ENVIRONMENTAL
- SOCIAL
- ECONOMIC

**IMPLEMENTATION FRAMEWORK**

- GOVERNANCE
- FINANCING
- MONITORING

**IMPACT ASSESSMENT**

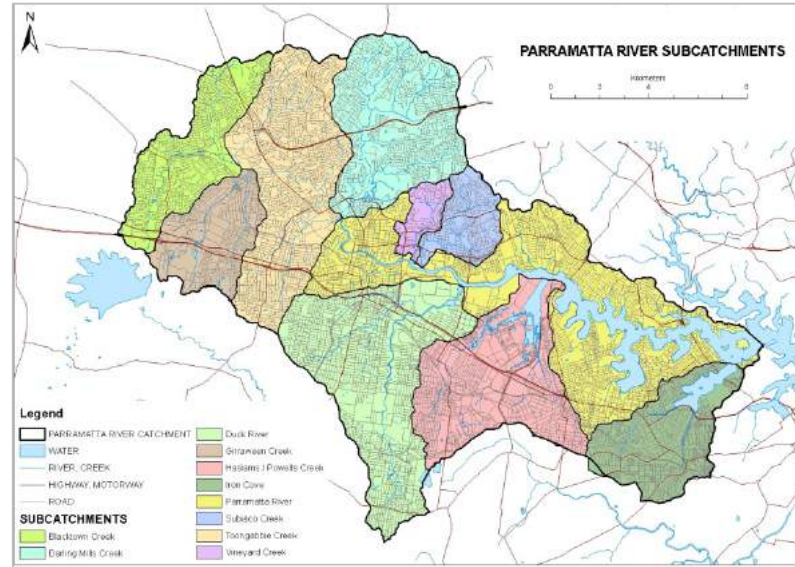
- ENVIRONMENTAL
- SOCIAL
- ECONOMIC

# Parramatta River, Australia



## VISION

Make the Parramatta river a living river and swimmable again by 2025.



Parramatta River catchment

### HIERARCHY OF PLAN

Catchment Level

### CATCHMENT PROFILE

Location: **Sydney**  
 Length: **14km**  
 Catchment Area: **266 sq. km.**  
 Population: **7.85 Lakhs (2011)**  
 Density: **2954 persons/sq.km**  
 Urbanization Rate: **Highly urbanised**

### DOCUMENT NAME

Parramatta River Master Plan, 2020

### CORE ISSUES

- Storm water pollution
- Weeds
- Erosion and sedimentation



Sewage inflow and weeds degraded the river leading to loss of fish biodiversity



PAST

### PRESENT



After restoration, Parramatta River has been made swimmable again



# Key Strategies of the Plan

## Environmental Strategies

1 Maximization of pervious area and vegetation coverage

2 Rainwater harvesting

3 Maximization of infiltration and evapo-transpiration

4 Treatment of runoff (adopted regional approach)

5 Vegetated stormwater treatment systems

6 Designed overland flow paths to include dense vegetation

7 Riparian vegetation protection and enhancement

1 Community engagement through web portals and forums

## Social Strategies

## Economic Strategies

1 Tourist spot creation

## Implementation Framework

### Issue Diagnosis

- Cost-Benefit Analysis conducted, with scenario development
- Networking
  - River awareness campaigns- River Aware
  - Community events- River fests
  - River Keeper Network

### Governance

Aboriginal Leadership with lead state agency, having sufficient powers and funding



### Financing

Economic returns from recreational site development and community engagement

## Expected Impacts

### Environmental

- Improved water quality
- Healthier ecosystem
- Five iconic species living in catchment and valued by community (their habitat requirements addressed)

### Social

- Community interests addressed
- Improved quality of living
- Improved livelihood opportunities

### Economic

- 80,000 visitors/ year
- 1.4 Million \$ economic return/year
- Local employment creation
- Physical health benefits

## Monitoring

- Annual reporting of progress
- Quarterly updating Master Plan Dashboard



## Impact assessment

Plan Assessment

Due consideration given

Mentioned but not in detail

Absent

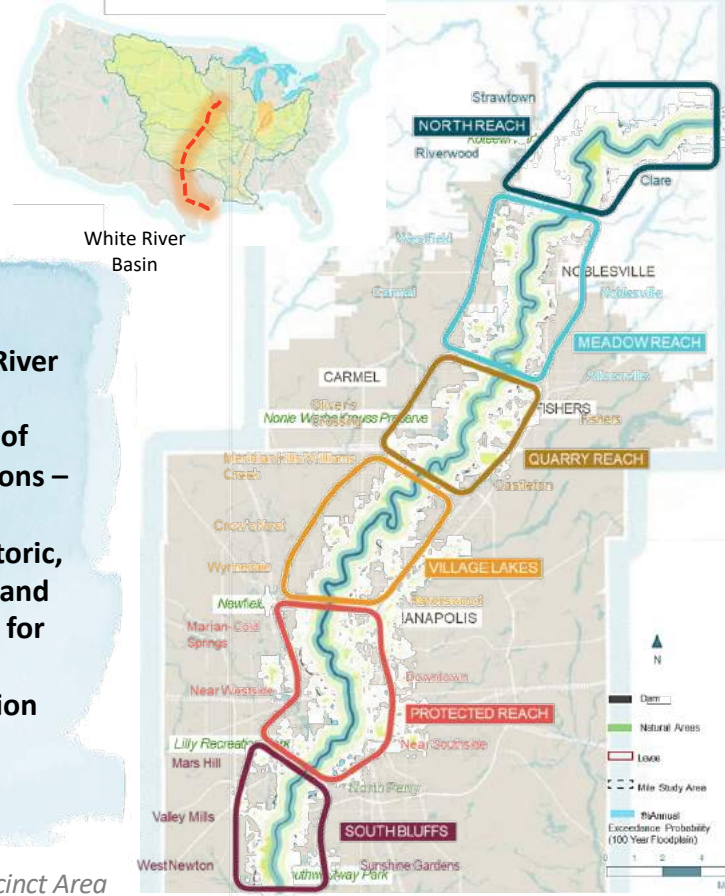
# White River, Indianapolis



## VISION

The White River will soon embody all of our aspirations – as a clean, natural, historic, connected, and active asset for the Central Indiana region to enjoy.

White River Precinct Area



## HIERARCHY OF PLAN

Precinct Level

## RIVER BASIN PROFILE

Location: **Indianapolis**  
 Length of River: **583 kms**  
 Catchment Area: **14,880 sq.km.**  
 Population: **2 million**  
 Precinct River Length: **78kms**  
 Precinct Area: **249 Sq. km.**

## DOCUMENT NAME

White River Plan, 2019

## CORE ISSUES

- Water pollution
- Flooding
- Sewage influences
- Loss of biodiversity
- Invasion by non-native plants
- Sedimentation



Because of the diverse landuse, threatened by a number of pollution risks across its watershed

PAST



PRESENT



Today, cleaner waters have made River a hotspot for numerous fish, mussels, birds, and mammals.



# Key Strategies of the Plan

## Environmental Strategies

- 1 Restore productive landscapes for water capture
- 2 Strengthen river infrastructure
- 3 Protect/ restore floodplains, and build resilience to climate change

## Social Strategies

- 1 Enhance community stewardship of river health

## Economic Strategies

- 1 Stabilize local businesses and expand commercial districts
- 2 Connect retail areas and neighborhoods to river amenities
- 3 Maximize multimodal connections along river - locally and regionally
- 4 Recapture economically productive landscape for recreation

## Implementation Framework

### Issue Diagnosis

Feasibility studies conducted, incorporating social, economic and environmental aspects

- In-person interviews, project website, community surveys
- Stakeholder consultations via appointment of Steering Committees, Stakeholder Committee and multi-topical task force

### Governance

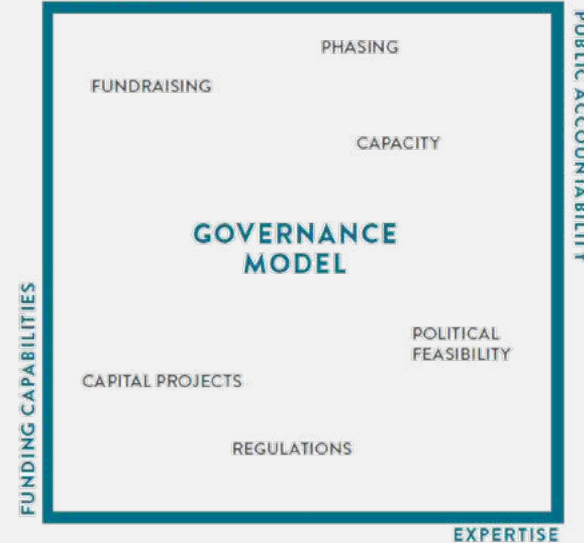
Community Driven Model for economic, social and political feasibility

#### Planning Phases



*With effective Community Engagement*

#### MOTIVATIONS



### Expected Impacts

#### Environmental

- Improved water quality
- Habitat restoration

#### Social

- Improved quality of living
- Community leadership

#### Economic

- Increase in tourist footfall
- Additional livelihood opportunities

### Financing

- Multiple ways of generating funds:
- General operating funds, grants, loans, donations
  - Tax increment financing districts
  - User fees, special levy
  - Real estate proceeds
  - Events and promotion, parking fees
  - Philanthropy/ corporate sponsorship

### Monitoring

White River Alliance - sole body appointed to coordinate monitoring and publicise River Monitoring Data with other stakeholders, such as:

- Hoosier Environmental Council
- Friends of the White River
- Marion County Soil and Water Conservation District (SWCD)
- Hamilton County SWCD
- Marion County Public Health Department
- Hamilton County Health Department, Reconnecting to Our Waterways

## Impact assessment

Plan Assessment

Due consideration given

Mentioned but not in detail

Absent

### STRATEGIES

### ENVIRONMENTAL

### SOCIAL

### ECONOMIC

### ISSUE DIAGNOSIS

### GOVERNANCE

### FINANCING

### MONITORING

### ENVIRONMENTAL

### SOCIAL

### ECONOMIC

### IMPACT ASSESSMENT

# Chicago River, US



**VISION**  
To Increase public access and create new recreational opportunities along the river for all the city's residents.

**HIERARCHY OF PLAN**  
Precinct Level

**DOCUMENT NAME**  
Chicago River Development Plan, 2020

**CORRIDOR PROFILE**  
Location: **Chicago**  
Length: **45 kms (approx.)**  
River stretch: **28 miles long within the city limits**

**CORE ISSUES**

- Impaired water quality
- Threatened habitat & wildlife
- Flooding
- Lack of public access
- Irresponsible development along river



Sewage influences and flooding instances of Chicago River

PAST

PRESENT

Improved riverfront with public access



# Key Strategies of the Plan

## Environmental Strategies

- River development zoning
- **River Bank Zone,**
  - **Urban Greenway Zone**
  - **Development Zone**

- 1 Restore & manage river edge buffers
- 2 Restore & enhance river banks
- 3 Create, restore & protect wetlands & riparian aquatic habitats
- 4 Establish river corridor education & management programs
- 5 Improve & protect water quality

## Social Strategies

- 1 Improve river access with Connected greenways

## Economic Strategies

- 1 Develop river as a recreational amenity
- 2 Provide Commercial opportunities at the riverfront

## Implementation Framework

### Issue Diagnosis

- Feasibility studies conducted incorporating social, economic and environmental aspects
- Capital Improvement Program - Project prioritization, final cost estimation, funding coordination
  - Public participation

### Governance

Decentralised approach, following 3 linked spheres of activities, by City of Chicago - Department of Planning and Development

#### STEERING COMMITTEE

Provide overall policy direction  
Setback & Environmental Sub-committee

Guidance on Specific implementation strategies  
Planning, Forest, Transport, Water, Park, Environment Department

#### KEY PARTNERS

Six-week period to provide opportunities for public comments and feedback

#### PUBLIC PARTICIPATION

Public/Private River Development Corporation  
IMPLEMENTATION

Planning Process

## Expected Impacts

### Environmental

- Improved water quality
- Habitat restoration, particularly of fishes

### Social

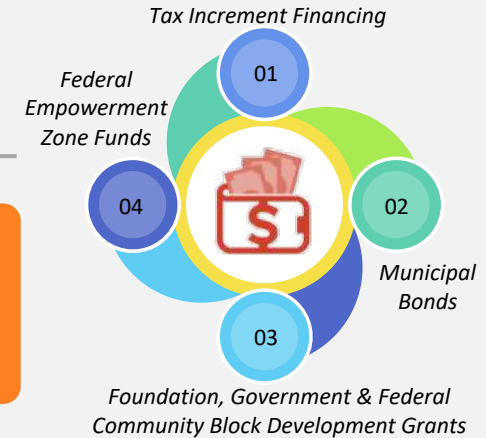
- Improved quality of living, owing to access to river

### Economic

- Increased (58 million) tourist footfall
- Livelihood opportunities creation

## Financing

10 year capital budget



## Monitoring

- Monitoring Stations by Chicago Department of Environment for
- Floodplain Development Compliance
  - Water quality

## Impact assessment

Plan Assessment

Due consideration given

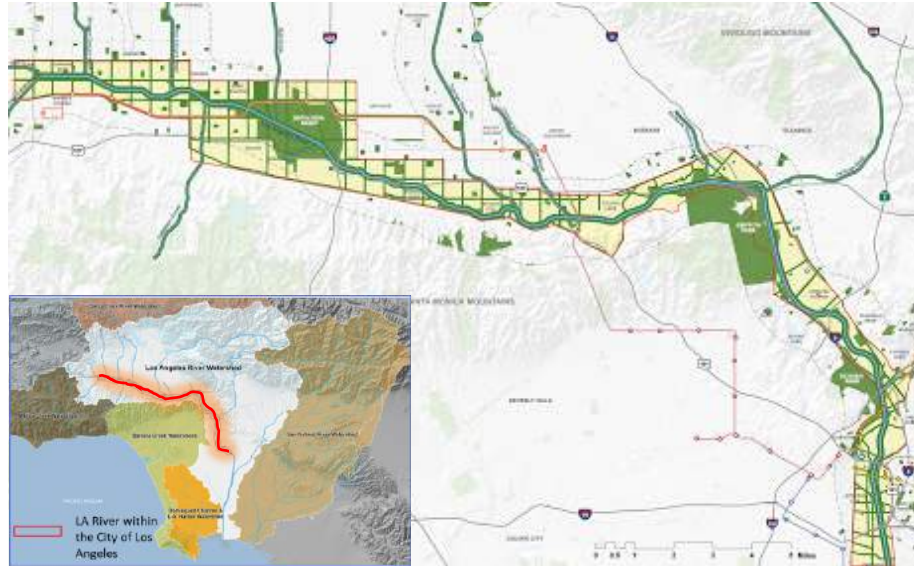
Mentioned but not in detail

Absent

# Los Angeles River, US

## VISION

Revitalize the river, green the neighbourhoods, capture community opportunities and create value.



LA River Corridor

## HIERARCHY OF PLAN

Corridor Plan

## DOCUMENT NAME

Los Angeles Revitalization Plan, 2007

## RIVER BASIN PROFILE

Location: **Los Angeles**  
Name of River: **LA River**  
Length: **32 miles**  
Catchment Area: **2,142 sq. km.**  
Population: **4 million (2017)**  
Density: **1868 persons/km<sup>2</sup>**

## CORE ISSUES

- Water pollution
- Flooding
- High flow velocity of river
- Variations in channel geometry
- Destruction of aquatic biota

Flooding owing to low capacity of water retention.



PAST

## PRESENT

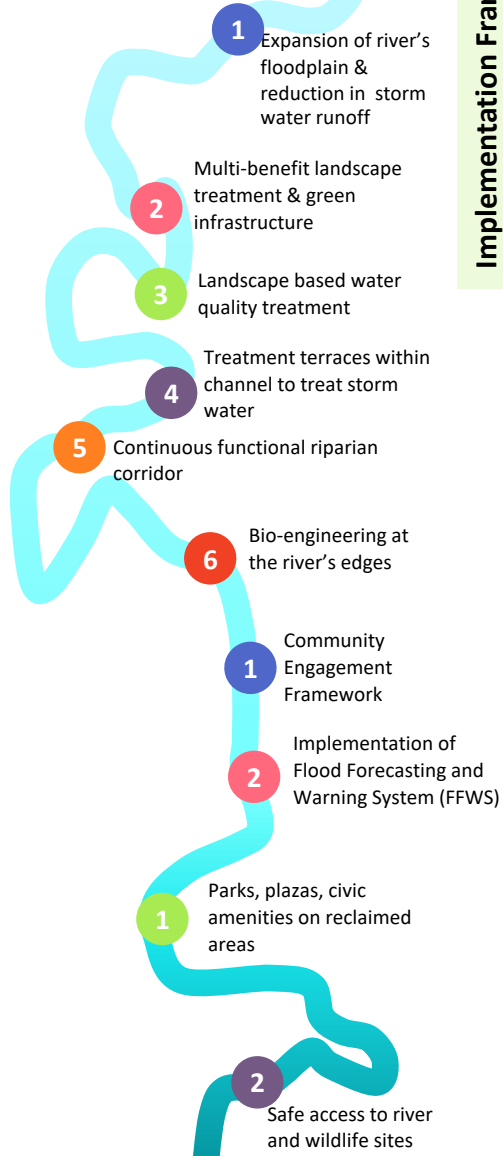


Now, offers a variety of uninterrupted trails for pedestrians, bicyclists, and equestrians.



# Key Strategies of the Plan

## Environmental Strategies



## Social Strategies

## Economic Strategies

## Implementation Framework

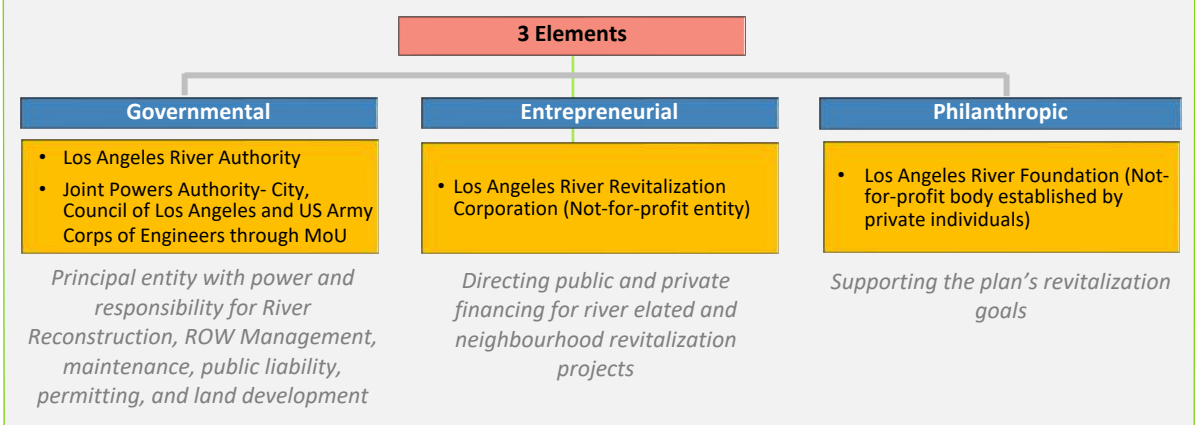
### Issue Diagnosis

Detailed cost-benefit analysis of alternatives with economic returns along with community engagement and likely environmental benefits

- Alternative scenario development
- Community engagement platforms
- To complement the Community Plan process, a River Improvement Overlay (RIO) district would be created

### Governance

Three-tiered structure proposed for managing a revitalized Los Angeles River



### Financing

Through Central and State sources along with Local Departments (ULB and water boards) and private entities

- Trust for Public Land
- The Conservation Fund
- National Fish and Wildlife Foundation

### Expected Impacts

**Environmental**

- Improved water quality
- Flood protection
- Restoration of habitat

**Social**

- Community interests addressed
- Improved QOL, owing to accessible & green environment

**Economic**

- 4.68-billion labor income
- Reduction in flood induced damage
- Increase in real estate values

## Impact assessment

Plan Assessment

Due consideration given

Mentioned but not in detail

Absent

**STRATEGIES**

ENVIRONMENTAL

SOCIAL

ECONOMIC

**IMPLEMENTATION FRAMEWORK**

GOVERNANCE

FINANCING

MONITORING

ENVIRONMENTAL

SOCIAL

ECONOMIC

**IMPACT ASSESSMENT**

ENVIRONMENTAL

SOCIAL

ECONOMIC

30

# The Four River Restoration, South Korea

## VISION

Reviving rivers, for a new Korea, clean rivers for recreational and cultural activities, a vibrant haven for wildlife and tourists



The Four Rivers Watershed

## HIERARCHY OF PLAN

Project Specific

## RIVER BASIN PROFILE

Location: **South Korea**  
 Name of River: **Han, Nakdong, Geum and Yeongsan rivers**  
 Length: **690 km**  
 Catchment Area: **69,534 sq. km.**  
 Population: **3.5 crores**  
 Density: **515 persons/km2**  
 Urbanization Rate: **81.5%**

## DOCUMENT NAME

The 4 River Restoration Master Plan, South Korea, 2012

## CORE ISSUES

- Drought
- Flooding
- Water pollution
- Injured aquatic ecosystem



Rivers and Wetlands were adversely affected with repeated drought and flood



PAST

## PRESENT



Components of infrastructure development, eco reserves etc.





# Sabarmati River, Ahmedabad, India

## VISION

A Multidimensional Environmental Improvement, Social Upliftment and Urban Rejuvenation.

The river was plagued with stretches of polluted stagnant water and in stretches it had dried



PAST



Sabarmati River Project Area

## HIERARCHY OF PLAN

Project Specific

## DOCUMENT NAME

Sabarmati Riverfront Master Plan, 2019

## PROJECT PROFILE

Location: **Ahmedabad, India**  
Name of River: **Sabarmati**  
Length: **371 kms**  
Catchment Area: **21,674sq.km.**  
Project Length: **11.5km**

## CORE ISSUES

- Water pollution
- Encroachment
- Sewage influences
- Direct industrial discharge
- Flooding

## PRESENT

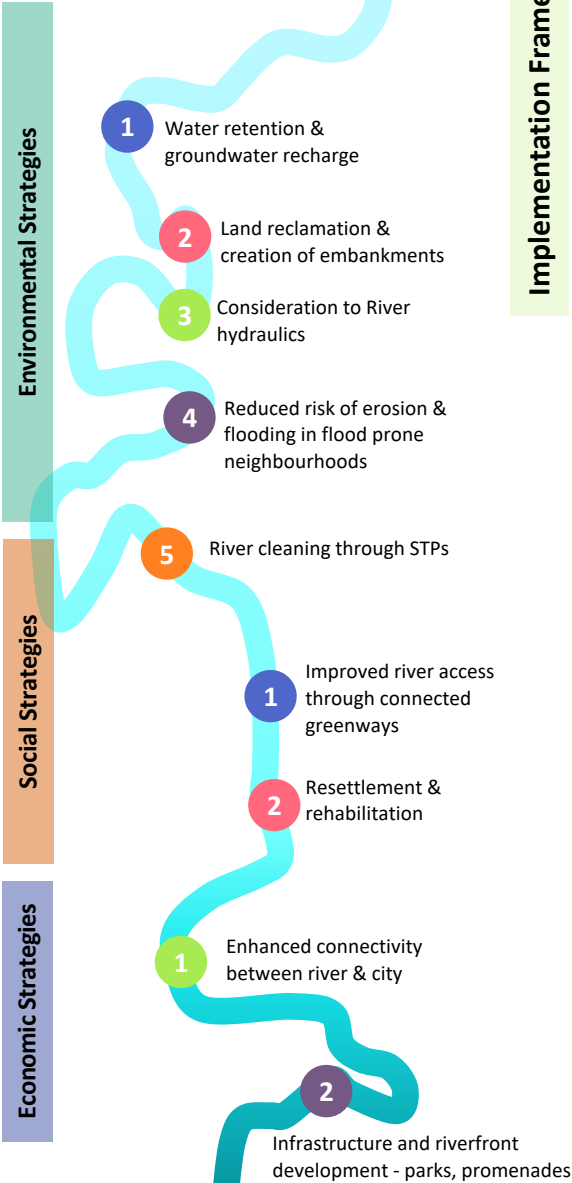


The river is seen as an example of revived river and an aesthetically designed riverfront



# Key Strategies of the Plan

Established land use policy for ecological restoration and the upliftment of economic value of the area.



## Implementation Framework

### Issue Diagnosis

- Feasibility Studies incorporating social, economic and environmental aspects, conducted in 1998 by SRFDC
- Alternatives developed and most feasible option chosen, depending upon the project risks it posed

### Governance

Special Purpose Vehicle driven governance framework



Ahmedabad Municipal Corporation (AMC)



Sabarmati River Front Development Corporation Ltd.1997

The AMC created a “wholly owned” company to develop the Sabarmati riverfront  
*Politically driven project*

### Monitoring

- No specific monitoring mechanism, however, significant measures have been taken under SMART Cities Mission
- Command & Control Centres executed, which plan to use sensors for monitoring mechanisms to device data evidence-based urban planning
  - Supervisory Control & Data Acquisition System (SCADA)

### Expected Impacts

#### Environmental

- Improved water quality
- 12.5 million cubic meter storage of river water for groundwater recharge
- Healthy ecosystem
- Extensive tree plantation

#### Social

- 50,000 people rehabilitated
- Informal markets for 25000 vendors and their families
- Direct benefits to 1,000s of Dhobis (washer men)

#### Economic

- 400 cr+ revenue generated with property development
- Tourist footfall increased (10 lakh/year)
- 202 Ha. land made available for further development

### Financing

- Loans from the Housing and Urban Development Corporation (HUDCO) (a large national level infrastructure funding agency), and the AMC.
- Land Based Financing - Property Development, 15% reclaimed land to be sold for revenue generation

## Impact assessment

Plan Assessment

Due consideration given

Mentioned but not in detail

Absent





From the practices observed across the globe, it can be pointed out that the River Management Plans are being prepared individually at multiple levels; starting from basin level and going down till the project scale; each differing in its time frame, capacity and level of participation from the stakeholders (particularly, the community). What goes amiss in this process is the integration of all these plans, which is very essential for effectively addressing the issues concerned here.

Better overall coordination at the river basin level is a pre-requisite for implementing the plans effectively. This, in turn, needs more integration at the operational level. Effectively, both top-down and bottom-up approaches have to be followed, to holistically address the concerns. This means to ensure that many physically separate actions at local scale must be planned and coordinated with optimum outreach, in combination with the larger holistic vision of river management the the basin scale.



# REFERENCES

## ONLINE LINKS REFERRED

- [http://cganga.org/wp-content/uploads/sites/3/2017/09/GRBMP-MPD\\_March\\_2015.pdf](http://cganga.org/wp-content/uploads/sites/3/2017/09/GRBMP-MPD_March_2015.pdf)
- <https://www.slideserve.com/keiko-gill/ganga-river-basin-environment-management-plan>
- <http://cwc.gov.in/sites/default/files/ganga-river-basin-assessment-report.pdf>
- <https://www.riob.org/en/file/264435/download?token=0mCgHuAE>
- [https://www.unescap.org/sites/default/files/Session%204b\\_Mr.%20Firman%20Sarifudin.pdf](https://www.unescap.org/sites/default/files/Session%204b_Mr.%20Firman%20Sarifudin.pdf)
- <https://www.gov.uk/government/publications/thames-river-basin-district-river-basin-management-plan>
- [https://streamsandvalleys.org/wp-content/uploads/2018/11/Confluence\\_Optimized.pdf](https://streamsandvalleys.org/wp-content/uploads/2018/11/Confluence_Optimized.pdf)
- <https://www.ourlivingriver.com.au/our-plan/parramatta-river-masterplan/>
- [https://mywhiteriver.com/wp-content/uploads/2020/03/WRVP-Report\\_Final\\_Web.pdf](https://mywhiteriver.com/wp-content/uploads/2020/03/WRVP-Report_Final_Web.pdf)
- <https://core.ac.uk/download/pdf/7035701.pdf>
- <http://studio-mla.com/design/los-angeles-river-revitalization-master-plan/#:~:text=The%20Los%20Angeles%20River%20Revitalization,milestone%20achievement%20for%20Los%20Angeles.&text=The%20plan%20outlines%20a%20framework,flood%20capacity%20and%20water%20quality>
- [https://www.un.org/waterforlifedecade/green\\_economy\\_2011/pdf/session\\_8\\_water\\_planning\\_cases\\_korea.pdf](https://www.un.org/waterforlifedecade/green_economy_2011/pdf/session_8_water_planning_cases_korea.pdf)
- <http://sabarmatiriverfront.com/master-plan>
- <http://www.drd.wa.gov.au/projects/Economic-Development/Pages/Fitzroy-catchment-management-plan.aspx>
- <https://www.groupgsa.com/en/projects/georges-river-precinct-plan/#:~:text=The%20Georges%20River%20Precinct%20Plan,City%E2%80%9D%20of%20South%20West%20Sydney>
- <https://www.brisbane.qld.gov.au/planning-and-building/planning-guidelines-and-tools/neighbourhood-planning-and-urban-renewal/city-reach-waterfront-master-plan/#:~:text=Key%20features%20of%20the%20master,river%20for%20water%2Dbased%20activities>
- [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/718327/Anglian\\_RBD\\_Part\\_1\\_river\\_basin\\_management\\_plan.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/718327/Anglian_RBD_Part_1_river_basin_management_plan.pdf)
- <https://www.iksr.org/en/eu-directives/european-water-framework-directive/river-basin-management-plan-2015>
- <https://www.ura.gov.sg/Corporate/Guidelines/Urban-Design/Singapore-River>
- [http://brahmaputraboard.gov.in/NER/Activities/Master/master\\_plans.html](http://brahmaputraboard.gov.in/NER/Activities/Master/master_plans.html)
- <https://wwfeu.awsassets.panda.org/downloads/WFD-PRD-en.pdf>

## COVER IMAGES LINKS

@ Public Domain Images, Skyline @ displate.com, Varanasi Ghat @ Pixa Hive







**Water and Environment Vertical**  
**National Institute of Urban Affairs**  
1st Floor, Core 4B,  
India Habitat Centre,  
Lodhi Road, New Delhi - 110003, India  
(+91-11) 24643284/ 24617517 (ext. 214)  
urvers@niua.org



**National Mission for Clean Ganga**  
Ministry of Jal Shakti, Government of India  
1st Floor, Major Dhyan Chand National Stadium  
India Gate, New Delhi – 110002, India  
(+91-11) 23072900-901  
admn.nmcbg@nic.in

