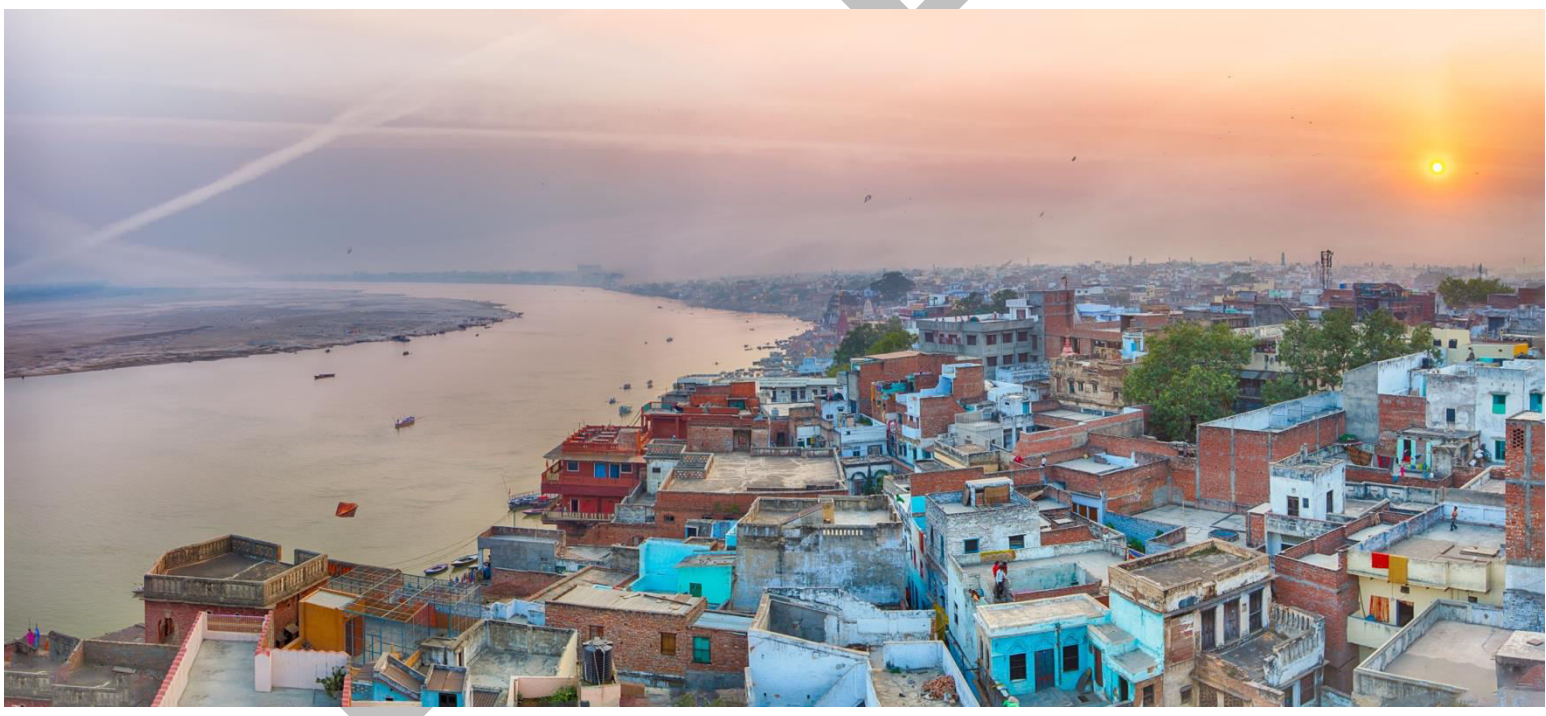
Draft Strategic Guidelines

MAINSTREAMING Urban River Management into Master Plans



Chapter 4.

Annexures

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Annexures

ANNEXURE-I

List of towns having Master Plans/ Development Plans, as per the state's Town & Country Planning Websites

Uttarakhand	
1	Doonghati
2	Dehradun
3	Haridwar
4	Chameli-Gopeshwar
5	Gaucher
6	New Tehri
7	Srinagar
8	Rishikesh
9	Badrinath
10	Paudi
11	Bageshwar
12	Rudrapur
13	Kashipur
14	Bajpur
15	Kichcha
16	Ramnagar
17	Kausani Lwesal
18	Nainital
19	Bhimtal
20	Rourkee
21	Gairsend
Uttar Pradesh	
1	Kanpur
2	Bithoor
3	Akbarpur-Mati
4	Lucknow Development Area
5	Unnao-Shuklaganj Development Area
6	Raebareli Development Area
7	Varanasi
8	Varanasi Part -B {Ramnagar-Mugalsarai}
9	Agra
10	Fatehpur -Sikri
11	Mathura-Vrindavan (Ka)

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12	Mathura-Vrindavan (Kha) {Kosikala, Nandgaon, Chata, Chaumuha}
13	Mathura-Vrindavan (Ga) {Govardhan-Radhakund}
14	Firozabad-Shikohabad Development Area
15	Aligarh Development Area
16	Allahabad Development Area
17	Bareilly Development Area
18	Meerut Development Area
19	Baghpat-Baraut-Khekada Development Area
20	Ghaziabad
21	Loni
22	Muradnagar
23	Modinagar
24	Bulandhsahar
25	Sikandarabad
26	New Sikandarabad
27	Jahangirabad
28	Kurja Development Area
29	Hapur
30	Garhmukteshwar-Brijghat
31	Pilkhuwa
32	Moradabad Development Area
33	Rampur Development Area
34	Jhansi Development Area
35	Orai Development Area
36	Ayodhya-Faizabad Development Area
37	Gorakhpur Development Area
38	Azamgarh Development Area
39	Saharanpur Development Area
40	Muzaffarnagar
41	Khatauli
42	Banda Development Area
43	Basti Development Area
Jharkhand	
1	Basukinath Nagar Panchayat
2	Bishrampur Nagar Parishad
3	Bundu Nagar Panchayat
4	Chaibasa Nagar Parishad
5	Chakradharpur Nagar Parishad
6	Chakulia Nagar Panchayat

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7	Chatra Nagar Parishad
8	Dumka Nagar Parishad
9	Garhwa Nagar Parishad
10	Giridih Nagar Parishad
11	Godda Nagar Panchayat
12	Gumla Nagar Parishad
13	Hazaribagh Municipal Corporation
14	Hussainabad Nagar Panchayat
15	Chas Municipal Corporation
16	Chhatarpur Nagar Panchayat
17	Chirkunda Nagar Parishad
18	Deoghar Nagar Nigam
19	Jamtara Nagar Panchayat
20	Adityapur Municipal Corporation
21	Jamshedpur NAC
22	Jhumritilaiya Nagar Parishad
23	Khunti Nagar Panchayat
24	Koderma Nagar Panchayat
25	Latehar Nagar Panchayat
26	Lohardaga Nagar Parishad
27	Madhupur Nagar Parishad
28	Manjhiaon Nagar Panchayat
29	Medininagar Nagar Parishad
30	Pakur Nagar Parishad
31	Rajmahal Nagar Panchayat
32	Sahibganj Nagar Parishad
33	Saraikela Nagar Panchayat
34	Simdega Nagar Parishad
35	Kapali Nagar Parishad
36	Mihijam Nagar Parishad
37	Nagar Uttari Nagar Panchayat
38	Phusro Nagar Parishad
39	Ramgarh Nagar Parishad
40	Jugsalai Municipality
41	Mango NAC
42	Ranchi Municipal Corporation
43	Dhanbad Municipal Corporation

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West Bengal	
1	Kolkata
2	Siliguri
3	Jalpaiguri
4	Naxalbari
5	Haldia
6	Asansol
7	Durgapur
8	Srinikatan Santiniketan Planning Area
9	Burdwan
10	Digha-Shankarpur Planning Area
11	Midnapur-Kharagpur Planning Area
12	Gangasagar-Bakkhali Planning Area
13	Jaigaon
14	Tarapith-Rampurhat
15	Furfura Sharif
16	Bakreswar
17	Patharchapuri
18	Mukutmanipur

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ANNEXURE-II

Ganga Basin Towns

List of towns on the main stem of Ganga River

STATE	NO. OF TOWNS
Uttarakhand	16
Uttar Pradesh	21
Bihar	18
Jharkhand	2
West Bengal	40
Total Basin Towns	**97**

S. NO.	STATE	TOWN
1	Uttarakhand	Haridwar
2		Rishikesh
3		Muni Ki Reti - Dhaulwala
4		Tapovan
5		Chamoli - Gopeshwar
6		Srinagar
7		Uttarkashi (Budkot)
8		Joshimath
9		Rudraprayag
10		Gaucher
11		Karnaprayag
12		Devprayag
13		Nandprayag
14		Kirtinagar
15		Badrinath
16		Gangotri Dham
1	Uttar Pradesh	Prayagraj (Allahabad)
2		Anoopsahar
3		Babrala
4		Ballia
5		Bijnor
6		Bithoor
7		Chunar
8		Farrukkabad
9		Garhmukteshwar
10		Ghazipur
11		Hastinapur
12		Jhunsi
13		Kannauj

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14		Kanpur
15		Mirzapur
16		Pt. Deen Dayal Upadhayaya (Mughal Sarai)
17		Narora
18		Ramnagar
19		Saidpur
20		Shuklaganj/ Gangaghat
21		Varanasi
1	Bihar	Patna
2		Bhagalpur
3		Begusarai
4		Munger
5		Chapra
6		Danapur
7		Hajipur
8		Buxar
9		Jamalpur
10		Barauni
11		Barh
12		Mokameh
13		Sultanganj
14		Fatuah
15		Bakhtiyarpur
16		Barahiya
17		Sonepur
18		Kahelgaon
1	Jharkhand	Sahibganj
2		Rajmahal
1	West Bengal	Baidyabati
2		Bally
3		Bansberia
4		Baranagar
5		Barrackpore
6		Behrampur
7		Bhadreshwar
8		Bhatpara
9		Budge Budge
10		Chakdah
11		Champdani
12		Chandannagar
13		Dhulian
14		Diamond Harbour
15		Garulia

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16		Gayespur
17		Haldia
18		Halishahar
19		Howrah
20		Hugli-Chinsurah
21		Jangipur
22		Jiaganj-Azimganj
23		Kalyani
24		Kamarhati
25		Kanchrapara
26		Katwa
27		Khardah
28		Kolkata
29		Konnagar
30		Maheshtala
31		Murshidabad
32		Nabadwip
33		Naihati
34		Panihati
35		Rishra
36		Santipur
37		Serampore
38		Titagarh
39		Uluberia
40		Uttarpara

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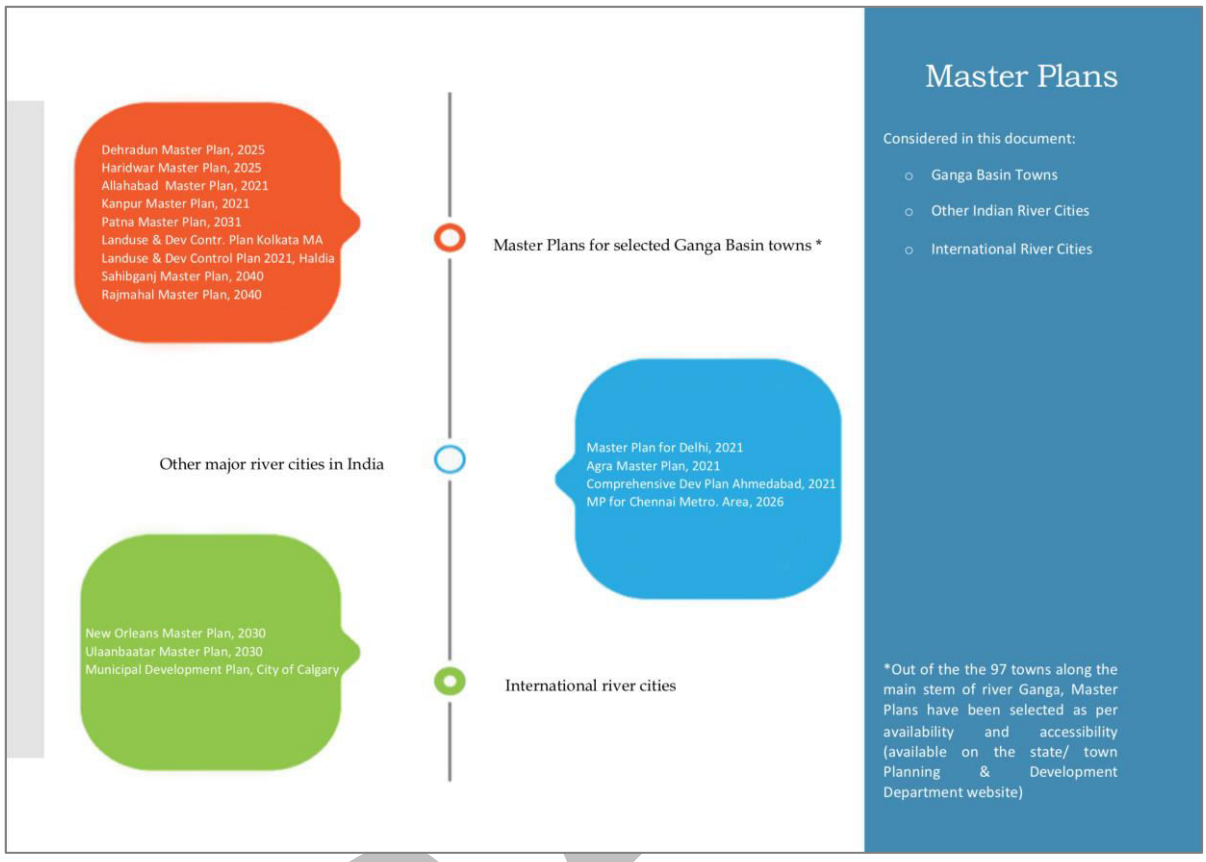
ANNEXURE-III

Comparison and contrast of Master Plans of selected towns



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Upper Ganga Basin | Uttarakhand

Dehradun Master Plan 2025

Ganga & Yamuna River

Parameters reflected in Master Plan

River Background
- Plan identifies the rivers flowing through the city
- Mention about historical construction of streams for irrigation
- Encroachment of river & drains identified as an issue
- Regional river-tourism context provided

Land use, use zone, use premise
- Plan earmarks existing land use as 'Green Belt/ Nallahs/ River'
- Land zone for rivers, drains, watersheds identified in the plan
- Land allocated for plantation along water bodies to avoid erosion, prevent encroachment and serve as recreational & recharge areas (10m along major rivers and watersheds, 5m along other drains)
- Proposal for construction of bridges over the rivers

Ground water augmentation
- Proposal for rainwater harvesting in recharge areas and all plots above 125sqm

River water extraction for city use
- Mention of water supply/ demand/ wastage quantum
- Mentions the need for a proposal to supply sufficient water

River pollutants
- Sewage disposal areas identified

Activities permissible in 'Water Enclosure'

Permissible use-
- River, stream & drain
- Riverbank parks & plantation
- Artificial reservoirs

Permissible use with permission from development authority-
- Max. 25sqm. construction in artificial reservoirs

Highlights of the Plan

River in Dehradun District

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Upper Ganga Basin | Uttarakhand

Haridwar Master Plan 2025

Ganga River

Parameters reflected in Master Plan

River Background
- Promulgated as a religious/ cultural centre of Ganga ghat

Land use, use zone, use premise
- Plan earmarks existing and proposed land use as 'agriculture/green area', with 'River/stream/drain' use zones
- Categories of activities identified within the river zone – 'Permissible'/ 'approval of authority'/ 'forbidden'
- Specifically residential, heavy/ harmful industries, objectionable activities not permissible
- Tourism spots identified along the banks

Ground water augmentation
- Proposal for development of traditional water sources and afforestation of watershed areas for revival. Water catchment for preventing soil erosion and decay of green cover, due to intense rainwater surface flow
- Provision for Rain Water Harvesting in all uses above 250sqm

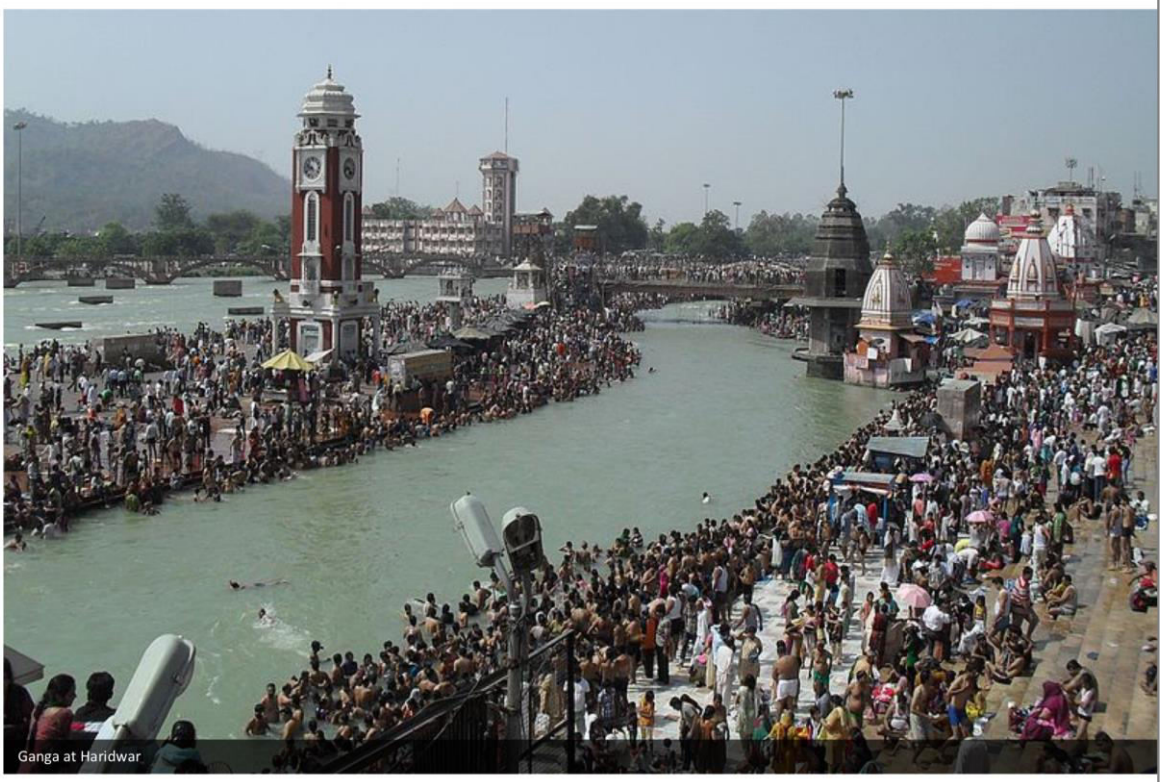
River water extraction for city use
- Quantum of water requirement and supply mentioned

River pollution
- Mention about pollution due to encroachment
- Introduction to the sewerage system

River navigation
- Tourism potential of the river identified

Development regulations within the river zone -
- Proposal for development and restriction of encroachment on riverbanks, and their use as open areas for festivals as well as environment catalysts
- Recommendation for using relatively sloping land and lower terrain near river/ drains, as parks/ play areas/ planted greens, and relatively higher terrain as residential
- Controlling of irregular mining activities near river/ drains, and proposal for dense plantation in the areas
- Plantation in sloping areas, and 10 to 20m along drains devoid of full development with afforestation activities promoted
- Allocation of land for plantation
- All construction except roads completely restricted in areas near river. Min. 50m along the banks of river, and 10m along other drains to be used for afforestation

Highlights of the Plan



Ganga at Haridwar

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Middle Ganga Basin | Uttar Pradesh

Kanpur Master Plan 2021

Ganga & Pandu River

Parameters reflected in Master Plan

Land use, use zone, use premise

- Plan earmarks existing land use as 'river & drains'
- River edge development to include development for eco-friendly tourism and activities
- Development of green area along rivers
- Zoning Regulations – areas shall be earmarked as
  - Special/ heritage zone
  - Rainwater Harvesting

Ground water augmentation

- Emphasis on promoting rain water harvesting

River pollution

- Various sources of pollution have been identified
- Emphasis on the pollution issue (pollution levels higher than determined standards)

Highlights of the Plan

Zoning Regulations

- Special/ heritage zone
  - Can include riverfront development or environmentally sensitive areas to avoid their deformation
  - Earmarking such areas and identifying permissible activities
- Rainwater Harvesting
  - Existing use of any water bodies above 1acre falling within any proposed landuse, to remain unchanged.
  - Enlisting such areas with their details and protection proposal

Execution of water harvesting plans

- Mention of dipping ground water levels
- Layouts for plans over 20acres to incorporate reservoir/ water bodies of approx. 5% land for ground water recharge, within parks and open areas
- Min. area of such water bodies to be 1acre and depth 6m, and layout to be provided with building/ floor plans.
- Construction of check dams to store rain water during peak season, for naturally increasing ground water levels.

River Ganga at Aanadeshwar Mandir, Kanpur

Middle Ganga Basin | Uttar Pradesh

Allahabad Master Plan 2021

Ganga, Yamuna & Saraswati River

Parameters reflected in Master Plan

River-sensitive Objective
Development of riverfront as a captivating area, making the zone pollution free

River Background
- Plan identifies the rivers flowing through the city
- Plan provides details of Kumbh Mela organized on river banks

Land use, use zone, use premise
- Plan provides guidance on River bank development
- Proposal for a green belt and parks along river bank, to serve as an open/ beautiful environment and an entertainment spot

Development Control Regulations
Plan defines 'Green Belt', with details of permissible activities

Ground water augmentation
- Provision of rain water harvesting, within building byelaws
- Existing use for natural water bodies above 1 acre falling within any land use, shall remain unchanged

River water extraction for city use
- Present/ projected water requirement mentioned
- Provisioning additional land requirement for water supply facilities through zonal plans

River pollutants
- Proposal for sewage & drainage Master Plan with comprehensive/ functional treatment for unserved areas, and details of untreated discharge, drain outfall, etc.
- Proposal for land allocation in each zone for sewage farms
- Sources of river pollution identified in the plan

River navigation - Inland waterways
- Plan allocates land for navigation facilities
- Proposal to extend navigation routes
- Proposal to develop Ganga-Yamuna rivers as regional/ local transportation routes.
- Provision of Water Transportation Depots through zonal plans

Green Belt Development Regulations –
Religious activities within 200m from river edge with regulations-
- Ground coverage 35%, FAR 1.5, permissible as per public facilities. Plot area not less than 1 acres
- Plan to safeguard river water from pollution to be submitted along building map, for necessary approvals
- Drainage/ sewer network to avoid direct discharge into the river
- Construction of septic tanks for areas without sewage facilities
- Lal Dora area be earmarked. Residential construction permitted for stay more than 10 yr. No colonization permissible

Proposing use of waste water for -
- Conversion into energy sources
- Water bodies after adequate treatment
- Irrigation
- Bio-electricity production

Highlights of the Plan

Yamuna during Megh Mela Festival, Allahabad

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Lower Ganga Basin | Bihar

Patna Master Plan 2031

Ganga, Sone, Gandak & Punpun River

Parameters reflected in Master Plan

River Background
Plan identifies the rivers flowing through the city, along with details of their area

Urban flooding
- Flood levels/ flood mapping/ vulnerability assessment, & integrated drainage plan have been incorporated
- Need for bunds/ embankments, storm water canals mentioned

Land use, use zone, use premise
- Plan earmarks existing land use as 'River/ Flood Plain'
- Plan earmarks proposed land use as
  - 'Special Reservations Zone (Bio Conservation Zone)'
  - 'Natural Heritage'
- Permitted & prohibited uses have been enlisted

Development Control Regulations
No landfill within 100mt. of navigable river

River water extraction
- Supply for part of the town, and irrigation for agricultural zones
- Surface water resources are under-utilized for drinking, due to high investment cost

River navigation
Inland waterway route, terminal, traffic, transport highlighted

Highlights of the Plan

Proposed Land use
- **Special Reservations Zone (Bio Conservation Zone) -** Lagoons and area along river, used for enhancing aesthetic value of river and for river front development/ public recreational activities
- **Natural Heritage** – River areas

Use Zones/ Permissible activities –
Bio-Conservation Zone
- Uses Permitted - Boating, Picnic huts, Camping sites, Special Training camps, higher order Educational/ technical/ research institutes (conditional)
  Uses Prohibited – any development between the River/Canal/Stream and the embankment
- Uses Permitted - River side green areas, Water Treatment Plant, Sewage Treatment Plant, Solid waste Treatment Plant, solid waste dumping grounds (conditional)
  Uses Prohibited - not related to Environmentally Sensitive Use Zone
- Uses Permitted - Riverfront Developments

Gandhi Ghat, Patna

Lower Ganga Basin | West Bengal

Land Use & Development Control Plan, Kolkata

Ganga River

Parameters reflected in Master Plan

River-sensitive Objectives

Development Policy states efforts to be made for -

- Development of river-front with pedestrian plaza and other conforming facilities along the river-bank
- Preserving wetlands, tanks, ponds, water bodies, wherever possible

Ground water augmentation

- Regulations stating no canal, pond, water body or wetland shall be filled up (unless allowed by authority taking in view drainage/ ecology & environment/ pisciculture/ fire fighting)

Highlights of the Plan

Development Control Regulations:

Prohibited buildings in Development Control Zone 'RF' (Riverfront):

- Existing/ new industrial building or extension
- Hazardous building
- New/ extension of existing buildings – residential, business, educational, institutional, mercantile (wholesale), mixed use, storage
- New/ extension of existing assembly buildings, excluding clubs, restaurants, eating houses, passenger stations, transport terminals, crematoria, bathing ghats
- Khatals (where cattle are kept)

Building restrictions for development Control Zone 'RF':

- Max. permissible height – 5.00m (without stilts) or 6.50m (including stilts).
- Min. height of stilt – 3.00m and stilted portion not allowed to be walled up or covered along the sides.
- Buildings alongside the river shall not be more than 20.00m long, with a clear linear gap of 50.00m between two buildings
- Max. permissible covered area – 200.00 sqm.

Budgebudge Ferry Ghat, Kolkata

Lower Ganga Basin | West Bengal

Land Use & Development Control Plan (LDUCP) 2021 for Old Haldia Planning Area

Ganga River

Parameters reflected in Master Plan

River Background

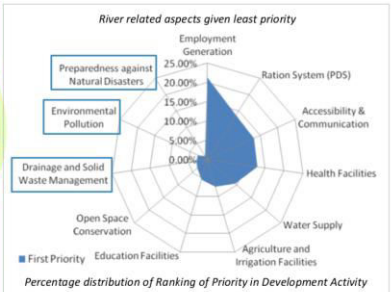
- Mentioned as a port area
- Planning principles stating areas of Heritage value will be given due importance and incorporated in the plan. Owing to its natural location, tourism activities will be proposed, especially along the river.

Land use, use zone, use premise

- Plan earmarks existing land use as 'water bodies/ wetland'
- Plan earmarks proposed land use as–
  Level I: Water Bodies,
  Level II: River/Stream/Canal/Lake/ Pond
- Land use shall earmark agricultural land, river basins, flood prone areas, streams and canals, water bodies
- Land allocation for regional infrastructure like WTP, STP, following the natural contours
- Alignments of the streams and canals shall be demarcated as per the drainage master plan
- Tourism activities shall be proposed along the river

Ground water augmentation

- Preserving wetlands, tanks, ponds, water bodies



Percentage distribution of Ranking of Priority in Development Activity

Zoning Regulations:

- The river bank shall be protected by a green belt / plantation
- 'Activities/ Uses Permitted', 'Permissible on application to Competent Authority (with conditions)', and 'Activities/Uses Prohibited' in 'Water Bodies (W)' Use Zone are enlisted (as below)

Highlights of the Plan

Uses/Activities permitted	Uses/Activities Permissible on application to the Competent Authority	Uses/Activities Prohibited
(a)	(b)	(c)
Rivers, canals	Fisheries	
Streams, water spring	Boating, water theme parks, water sorts, lagoons	All uses not specifically permitted in column (a) and (b)
Ponds, lakes	Water based resort with special by-laws	
Wetland, aqua culture pond	Any other use/activity incidental to water bodies Use Zone is permitted	Use/Activity not specifically related to Water bodies Use not permitted herein
Reservoir		
Water logged/marshy area		
Recreational with special bye laws	Heritage interpretation centre, art galleries and sculpture complex	Use/activity not specifically related to Special Heritage Use Zone not permitted herein
Public- semi public with special bye laws	Educational and research institutions	Mult-storeyed building
Commercial with special bye laws	Social and cultural institutions	Mult-plex, Shopping Mall
Theme parks, Archaeological Parks/ Gardens	Craft based cottage industries	Dumping ground
Amphitheatres	Hotels, guest houses, lodges, resorts	Sewage Treatment
		All uses not specifically permitted in column (a) and (b)
Open Air Museums/ exhibition space with special bye laws	Boating, picnic huts, camping sites, special training camps	No development of any kind is permitted between the River/Canal/Stream and the embankment
River front developments	Theme parks, yoga parks, sports centres and community recreational areas, international convention centre	
River side green areas	Parking areas, visitor facilities	
Scenic value areas	Incidental residences	
	Art academy, media centres, food courts, music pavilions	
	Educational, technical, research institutes of higher order	

Haldia Port

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Delhi

Master Plan Delhi 2021

Yamuna River

Parameters reflected in Master Plan

River Background
Plan identifies the rivers flowing through the city, along with details of their area

Land use, use zone, use premise
- Plan earmarks existing and proposed land use as 'Green Belt & Water Body', with 'River & Water Body' use zone
- Landscaping drains and waterfront as interconnected parkways

Ground water augmentation
- Mention of recharge & annual rainwater harvesting potential
- Proposal for Integrated Water Resource Management - 'zero run-off drainage', 'regulated flood plain reservoirs', balancing ponds/ retention ponds/ sediment traps, for storing monsoon overflow with segregated wastewater disposal system
- Proposal to use treated wastewater for ground water augmentation

River water extraction
- Mention of river water allocation/ ranney wells in Yamuna flood plains, transit losses, inter-State river water allocation
- Proposal for increase in raw water allocation

River pollution
- Details of BOD/ total coliform levels
- Drain outfalls identified
- Pollution control measures and eco-sensitive land use controls

Highlights of the Plan

Focal points of the plan
Rejuvenation of Yamuna through-
- adequate flow by release of water,
- refurbishment of trunk sewers,
- treatment of drains,
- sewering of unsewered areas,
- treatment of industrial effluents,
- recycling of treated effluents,
- removal of coliforms at STPs

Yamuna Action Plan
Recommendations of a committee formed to draw up an Action plan for the cleaning / rejuvenation of the Yamuna River-
- Min. flow to be ensured by Riparian states by releasing adequate water
- Refurbishment of Trunk Sewerage System, that is in highly dilapidated condition and has been silted
- Treatment of the flows from major drains falling in the river, by laying internal sewerage system/ installation of decentralized treatment plants
- Laying of Sewer Lines in the un-sewered areas of the city
- Clearing slum clusters from riverbed
- Treatment of Industrial Effluent before discharge into the drains/river, through better capacity utilisation and laying of conveyance system wherever required
- Re-use of Treated Effluent
- Coliform removal at STPs to permissible levels in treated wastewater

Yamuna in Delhi

Uttar Pradesh

Agra Master Plan 2021

Yamuna River

Parameters reflected in Master Plan

Land use, use zone, use premise

The plan proposes -

- Parks, recharge zones and tourism activities in open areas adjacent the river
- Plantation within 3m on both sides of the major drains

Ground water augmentation

- Proposal for adequate Sewage/ Water Treatment plants with new/ improved technologies
- Proposal for barrage upstream of river
- Proposal for water harvesting, reducing wastage while transmission/ distribution

River water extraction

Mention of details regarding quantum of water supply

River pollution

Details of treated and untreated sewage/ drainage discharge in the river

Highlights of the Plan

Specific proposal for water harvesting

- Identification & protection of existing natural water bodies, permitting no other land use
- Area around water bodies to be developed as tourist zones, wherever possible
- Water reservoir (min. 1 acre and 6m deep) on almost 5% area, for all plans over 20 acres, with parks/ open areas
- For all plans less than 20 acres, provision of recharge well/ tank, as per determined standard of the park/ green belt
- Zoological/ Hydro-zoological survey to propose ground water recharge
- Permanent structures not more than 5% of the park area. Footpaths/ tracks of permeable/ semi-permeable perforated blocks
- Less water consuming plants for roads, parks and open areas
- Permeable pavements along roads for ground water recharge
- Proposal for rooftop rain water and recharge structures in all existing/ to be constructed official complexes.
- Recharge through percolation pits catching water from terraces/ open areas of all uses having an area above 1000sqm.

Yamuna in Agra

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Gujarat

Ahmedabad Comprehensive Development Plan 2021

Sabarmati River

Parameters reflected in Master Plan

Urban flooding
Plan identifies the flood risk areas

Land use, use zone, use premise
The plan provides guidance on Special Planned Area Development -

- Sabarmati Riverfront Development (SPD-1) - special area zone, planned and developed, contains various uses along with adequate provision of open spaces, parks and gardens. Located in 11.5kms stretch along river covering about 200 Ha of land
- FSI as applicable
- Permissible Uses as per SRFD Master plan

Development Control Regulations

- Regulations regarding min clearance from the water body
- No development in area designated for water body, pond and talab in Development Plan excluding riverfront
- Special regulations pertaining to ground coverage, margins, height of building, use of building etc. that will prevail over General Development Regulations.

Ground water augmentation
Rain water harvesting proposal, through rain water disposal (channelling rain water discharge from a building-unit to a public storm water drain) and mandating rain water harvesting/ storage as per building sizes.

Minimum Distance from Water body

- Minimum clearance of 30mts between boundary of the bank where there is no embankment and any development work or part thereof
- Minimum clearances of 15mts between embankment of a river and any building or part thereof or any other clearance as may be prescribed under any other general or specific orders of Government and appropriate Authority whichever is more

Highlights of the Plan

Ahmedabad Riverfront

National Institute of Urban Affairs

Tamil Nadu

Master Plan for Chennai Metropolitan Area 2026

Cooum & Adyar River

Parameters reflected in Master Plan

River Background
Plan identifies the rivers flowing through the city, along with details of their area

River Zone Delineation
- Floodplain zoning and restrictions

Urban flooding
- Details of past occurrences
- Contour details
- Flood risk mapping and strategies to reduce damage
- Drainage Master Plan proposed

Land use, use zone, use premise
- Greens along riverbanks

Development Regulations
- Restricted developments in Aquifer Recharge area

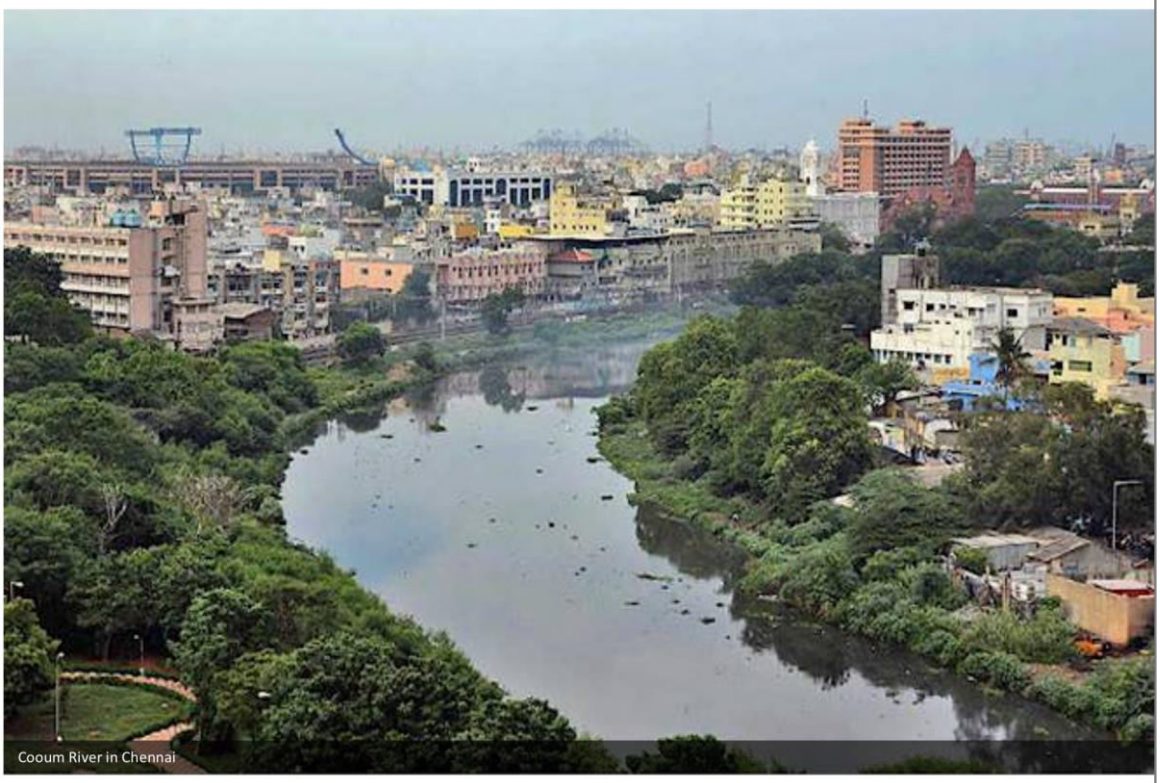
Ground water augmentation
- Desilting, improvements and conservation of lakes
- Details of ground water levels and quality

River pollution
- Waterway basin-wise sewage generation, no. of outfalls details

Floodplain zoning
- Follow GoI notification, declaring the costal stretches of seas, bays, estuaries, creeks, rivers and back-waters upto 500m from the High Tide Line (HTL) as Coastal Regulation Zone (CRZ)
- Restrictions on both sides in case of rivers, creeks and backwaters
  - To be kept clear of all activities
  - Suitable trees and plants to be planted
  - Free from artificial development
  - Pollution from industrial and town wastes must be avoided

CRZ	Permissibility
CRZ-I	Ecologically sensitive areas between high and low tide line, natural gas exploration and salt extraction permitted
CRZ II	Areas up to shoreline of the coast, unauthorized structures not allowed
CRZ III	Rural and urban areas outside CRZ-I and CRZ-II, only agriculture-related activities and public facilities permitted
CRZ IV	Aquatic areas up to territorial limits

Highlights of the Plan



Cooum River in Chennai

National Institute of Urban Affairs

Louisiana

New Orleans Master Plan 2030

Mississippi River

Parameters reflected in Master Plan

River-sensitive Vision
River-centric vision for city development

River Background
Reinventing city's Crescent Plan to reinforce the river's critical role

Urban flood management
Planning for flood protection, stabilization of neighborhoods (disaster risk, climate change mitigation strategies)

Landuse, use zone, use premise
- Eco-friendly uses proposed
- New public parks and recreation areas developed

Development Control Regulations
No structures permissible except those necessary to support specific conservation aims or low-impact amenities

Ground water augmentation
- Feasibility of river as a potential for managing groundwater
- Conservation/ storm-water management techniques

River water extraction for city use
Water supply, WTP that purify river water, capacity information

River pollution
Details of sewage and drainage system

River navigation
Potential of new ferry connections for fast/ efficient mass transit

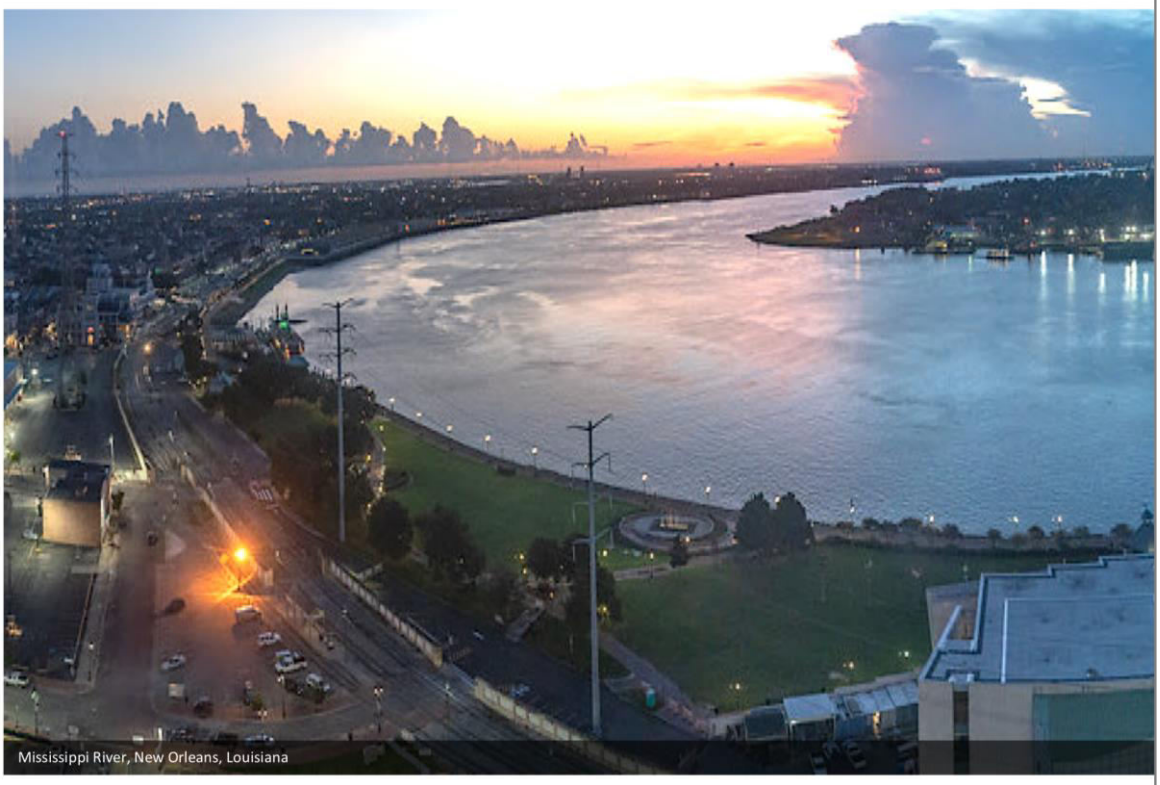
River Ecology/ Environmental Services
Reduce the city's carbon footprint - reducing leakage of treated water and overreliance on pumped drainage

Highlights of the Plan

Vision for New Orleans, 2030
- A city that celebrates its relationship to water and uses water-management strategies to provide amenities to neighborhoods wherever possible

Landuse, use zone, use premise
- **Natural Area** - Increase, retain and preserve ecologically sensitive habitats by conserving, improving, and/or restoring for aesthetic value, biodiversity, natural disaster resilience, natural resource and wildlife conservation, and nature-oriented recreation
- **Celebrate the city's relationship to water-** linked by green-blue corridors (landscaped canals, rain gardens, restored wetlands) that improve public understanding of water systems, spur adjacent private economic investment
- Reclaim river and lake waterfronts for lively public spaces
  - Crescent Park - linear park, along riverfront with paths to discourage run-off, and adaptive reuse of wharves
  - Lafitte Greenway – pedestrian/ bicycle urban trail, with landscaping, bio-swales, storm-water retention features

Establish Riverfront Advisory Committee



Mississippi River, New Orleans, Louisiana

Mongolia

Ulaanbaatar Master Plan 2030

Tuul River

Parameters reflected in Master Plan

River Background
Plan identifies the rivers flowing through the city

River-sensitive Vision and Priorities
- Vision - City is Environmentally Friendly
- Objectives - safe, healthy, green city, resilient to climate change
- Strategies - Establish sustainable environmental management

River Zone Delineation
Designates rivers as special protection areas and renew the existing protection area boundaries

Urban Flooding
- Flood control areas should be identified
- Infrastructure to store/ redirect flood waters, where required

Land use, use zone, use premise
- Green/Open Space - areas for recreation, ecological conservation and to enjoy nature
- Establish waterfront open space along rivers and streams, with connected parks/ green space for residents and tourists.

Ground water augmentation
Ground water sources mapped

River water extraction for city use
- Drinking water sources - groundwater aquifers and river water
- New infrastructure will be constructed to provide water

River pollution
- Existing waste water treatment plant should be improved using state-of-the-art technologies and additional plants should be established to meet the demand

Highlights of the Plan

- Ulaanbaatar city Green Belt – at the edges to contain size of city and limit development in high flood risk areas, areas in the city's drinking water catchment and restricted area (natural preservation areas, water resource protection areas). Include existing strictly restricted areas.
- Implement river enhancement projects

River in Ulaanbaatar

National Institute of Urban Affairs

NAMAMI GANGE

Alberta

Municipal Development Plan, Calgary, 2009 (60 yr. plan)

Bow & Elbow River

Parameters reflected in Master Plan

River-sensitive Objectives
Protect, conserve/enhance water quality/ quantity by assigning land use and framework that protects the watershed

River Background
- Identifies rivers flowing through the city, with watershed details
- Proximity to riverfront adds value to open space system

Urban flooding
- Regulating land uses/ development within Flood Hazard Areas
- Flood hazard mapping (using 100 year flood event)

Land use, use zone, use premise
- Maintain and enhance the riverfront as an active, liveable, pedestrian/bicycle-oriented amenity
- Maintain/ improve public access to major water bodies/ rivers
- Open space typology - Rivers and creeks; River valleys
- Riverfront Areas - development of park and pathway system, with public plazas/ seating/ landscape features along the riverbank sensitive to existing natural habitat

Ground water augmentation
Protect Watersheds-drains, springs, wetlands, ponds, streams, lakes

River water extraction for city use
Provision, alignment, capacity of water distribution mains

River pollution
Provision, alignment, capacity of sewer/ stormwater mains/ trunks

River Ecology/ Environmental services
- Network - rich with wildlife habitat, and natural vegetation
- Protect biodiversity in river valleys, ravines, coulees, wetlands
- Riparian Strategy - Sustaining Healthy Rivers and Communities

Highlights of the Plan

Protecting aquatic and riparian habitats
- Ensure "no net loss" principles of significant wetland habitat and preserve existing wetlands as a priority over reconstruction.
- Protect aquatic habitats through preservation, restoration and creation of wetland bank sites.
- Protect riparian areas to meet habitat, water quality and public access through environmental reserve dedications and design alternatives.
- Encourage and enable protection of source water and groundwater recharge areas.

Top priorities to reducing flood impact-
- Appropriate land use and development regulations;
- Mitigate the potential impact or obstruction of floodwaters;
- Enhance Calgary's flood resiliency by employing a comprehensive approach to flood risk reduction measures
- Align policies and regulations to meet the minimum standards
- All buildings located in the floodway, flood fringe or overland flow area must be designed to prevent:
  - damage by floodwaters;
  - damage by elevated groundwater;
  - incremental increase of upstream river water levels.

Bow Bridge, Calgary