Centre for Ganga River Basin Management and Studies

cGanga

Welcome

Friday, May 31, 2024
CSIR-NEERI Nagpur

First SAC Meeting

CAMP - Condition Assessment and Management Plan

NRCD - National River Conservation Directorate
Do WR, RD & GR
Ministry of Jal Shakti, GoI

Dr Vinod Tare
Founding Head – cGanga

Welcome

Dr Atul Vaidya

Director

National Environmental Engineering Research Institute

Nagpur

Condition Assessment and Management Plan (CAMP)
For Six River Basins
(Mahanadi, Narbada, Godavari, Krishna, Cauvery & Periyar)

Agenda
First Stakeholder Advisory Committee
Friday, May 31, 2024; 10:00 - 13:00 h

Welcome, Dr Atul Vaidya, Director, CSIR-NEERI, Nagpur
Opening Remarks: Mr Rajeev Kumar Mital, Project Director, NRCD, Do WR, RD & GR, Mo Jal Shakti, GoI
Introduction of Participants
About CAMP and its Preparation by 12 Institutes in the Basin States: Dr Vinod Tare, Founding Head, cGanga, IIT Kanpur
Release of Pragyambu – A Quarterly Newsletter in Different Languages

Agenda

First Stakeholder Advisory Committee

Friday, May 31, 2024; 10:00 – 13:00 h
National Environmental Engineering Research Institute
(CSIR - NEERI), Nagpur

Studies Conducted & Plans Prepared by Various States for River Basins and Reflection on CAMP by various Basin States of Mahanadi, Narmada, Godavari, Krishna, Cauvery & Periyar

Representative of Central Water Commission
Representative of Central Ground Water Board
Mr Suresh Babu, WWF - India
Dr Tanveer, Wildlife Institute of India, Dehradun
Dr K Ravichandran, Director, Indian Institute of Forest Management, Bhopal

Agenda
First Stakeholder Advisory Committee

Studies Conducted & Plans Prepared by Various States for River Basins and Reflection on CAMP by various Basin States of Mahanadi, Narmada, Godavari, Krishna, Cauvery & Periya
Representative of Orissa Government
Representative of Chhattisgarh Government
Representative of Madhya Pradesh Government
Representative of Gujrat Government
Representative of Maharashtra Government
Representative of Telangana Government
Representative of Andhra Government
Representative of Karnataka Government
Representative of Tamil Nadu Government
Representative of Kerala Government

Condition Assessment and Management Plan (CAMP)
For Six River Basins
(Mahanadi, Narbada, Godavari, Krishna, Cauvery & Periyar)

Agenda
First Stakeholder Advisory Committee

Friday, May 31, 2024; 10:00 – 13:00 h
National Environmental Engineering Research Institute
(CSIR - NEERI), Nagpur

Discussion
Closing Remarks by Ms Debashree Mukherjee, Secretary, Do WR, RD & GR, Mo Jal Shakti, GoI
Vote of Thanks by Mr Pradeep Agarwal, JS, NRCD

Introduction
Participants

About CAMP for Six River Basins

Dr Vinod Tare, Founding Head, cGanga, IIT Kanpur

Major River Basins in India

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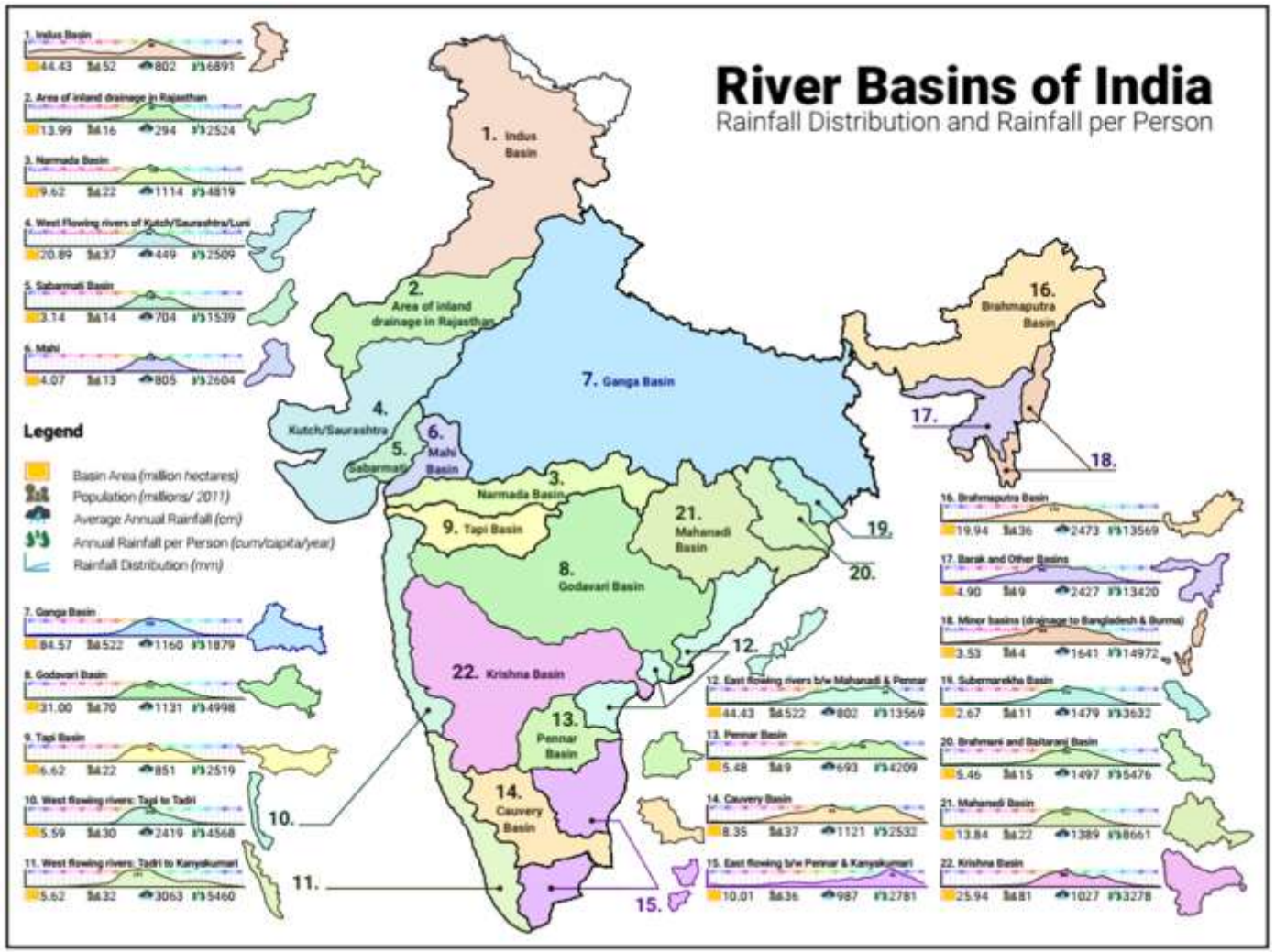
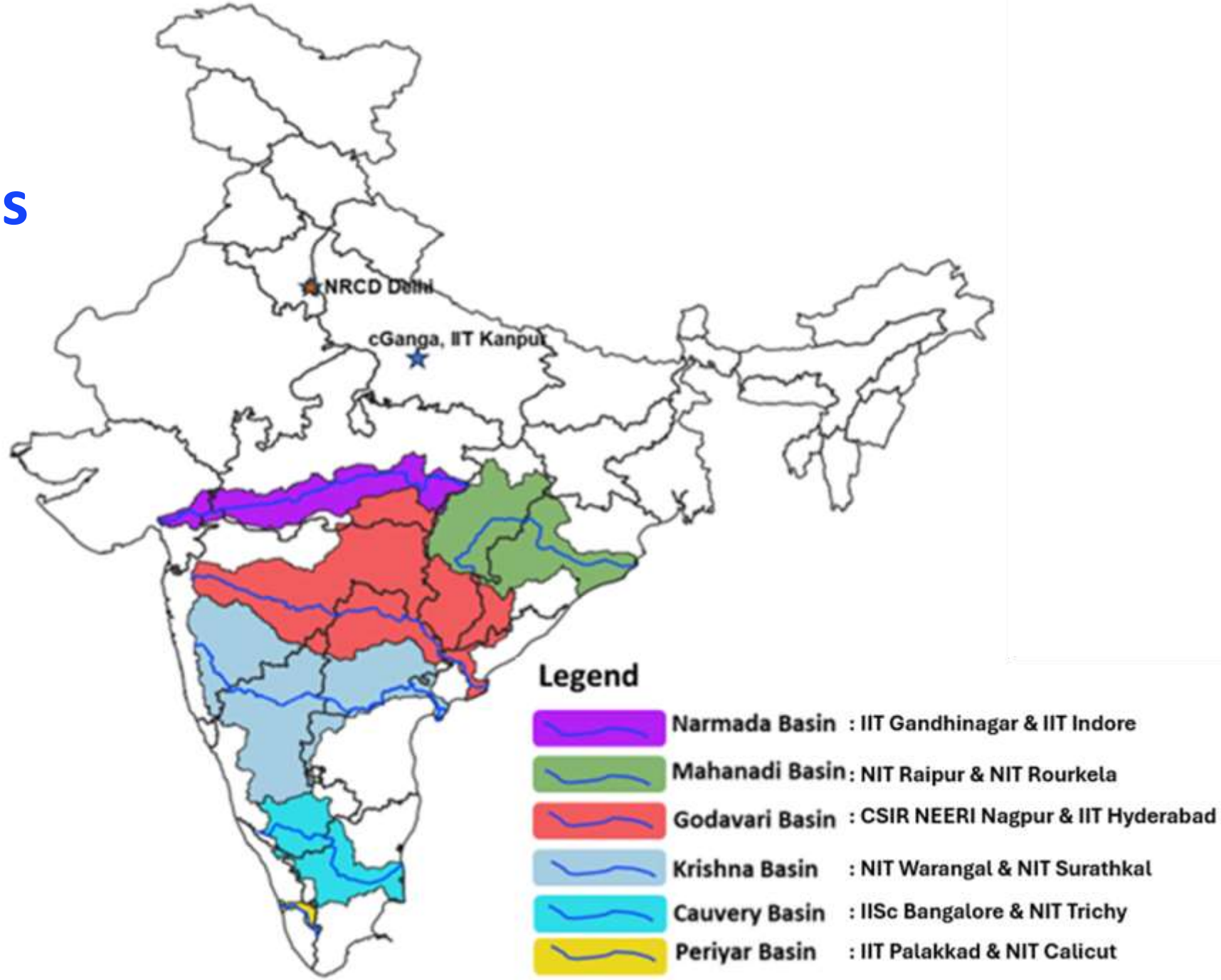


S No	Basin Code	Basin Name
1	3	Narmada
2	21	Mahanadi
3	8	Godavari
4	22	Krishna
5	14	Cauvery
6	-	Periyar

River Basins with Boundaries of States

States Involved:

1. Orissa
2. Chhattisgarh
3. Madhya Pradesh
4. Gujrat
5. Maharashtra
6. Karnataka
7. Andhra Pradesh
8. Telangana
9. Tamil Nadu
10. Kerala
11. Puducherry



Mapping of Concerned Offices, Institutions, and Individuals

SAC
Stakeholder Advisory Committee

1. **Chair:** Secretary, MoWR, RD & GR, Jal Shakti, GoI
2. Project Director, NRCD; Member
3. Chief Secretary or Nominee (not below rank of Principal Secretary) ; Member [*CG, OR, MP, GU, MH, AP, TG, KA, KL]*
4. Chairman/Member Secretary State PCB; Member [*CG, OR, MP, GU, MH, AP, TG, KA, KL]*
5. Chairman CWC or Nominee (not below rank of Member CWC); Member
6. Chairman CGWB or Nominee (not below rank of Member CGWB)
7. Chairman / Member Secretary CPCB; Member
8. Director, FRI or Nominee (not below the rank of ADG); Member
9. Director, Wildlife Institute of India, Dehradoon; Member
10. CEO or Nominee, WWF-India; Member
11. Representative of any other NGO/CSO (to be nominated by MoJS); Member
12. Chairman Scientific & Technical Steering Committee; Member
13. Team Leads of Consortium Institutes as permanent invited members; Member
14. **Member Secretary:** Director (NRCD), DoWR, RD & GR, MoJS

STSC
Scientific & Technical Steering Committee

1. **Chair:** Vinod Tare, cGanga, IIT Kanpur
2. Rakesh Khosa, IIT Delhi; Member
3. Mohammad Jawed, IIT Guwahati; Member
4. Indrajt Dube, VC, NLU, Member
5. Riddhi Singh, IIT Bombay; Member
6. Balaji Narsimhan, IIT Madras; Member
7. R R Mishra, Former DG, NMCG & IIT Roorkee; Member
8. Sanmit Ahuja, Expert Member, cGanga
9. A A Kazmi, IIT Roorkee; Member
10. Suresh Babu, WWF-India, Member
11. Saumitra Mukherjee, JNU; Member
12. M S Mohankumar, IISc Bangalore; Member
13. Executive Director – Technical, NMCG
14. Member Secretary, CPCB
15. Director, River Data Directorate, CWC
16. Director, Indian Institute of Forests Management, Bhopal
17. **Member Secretary:** Director, NRCD, MoJS

JRC
Joint Review Committee

1. **Chair:** Project Director, NRCD
2. Director, Lead Institute; Member
3. Director, Fellow Institute; Member
4. ED (Technical), NMCG, MoJS; Member
5. Representative of the Concerned State Government dealing with Water Resources; Member
6. Representative of the Concerned State Government dealing with Water Resources; Member
7. Chair STSC**, Member Advisor**
8. Director, NRCD; Member Secretary

Institutions Suggested for Preparing River Basin Plans

- NIT Raipur & NIT Rourkela (Mahanadi River Basin)
- IIT Indore & IIT Gandhinagar (Narmada River Basin)
- CSIR NEERI & IIT Hyderabad (Godavari River Basin)
- NIT Warangal & NIT Suratkhal (Krishna River Basin)
- IISc B'lore & NIT Trichy (Cauvery River Basin)
- IIT Palakkad & NIT Calicut (Periyar River Basin)

Water Vision @ 2047 – Way Ahead

Challenge:

Not the Quantity of Fresh Water on an Annual basis but

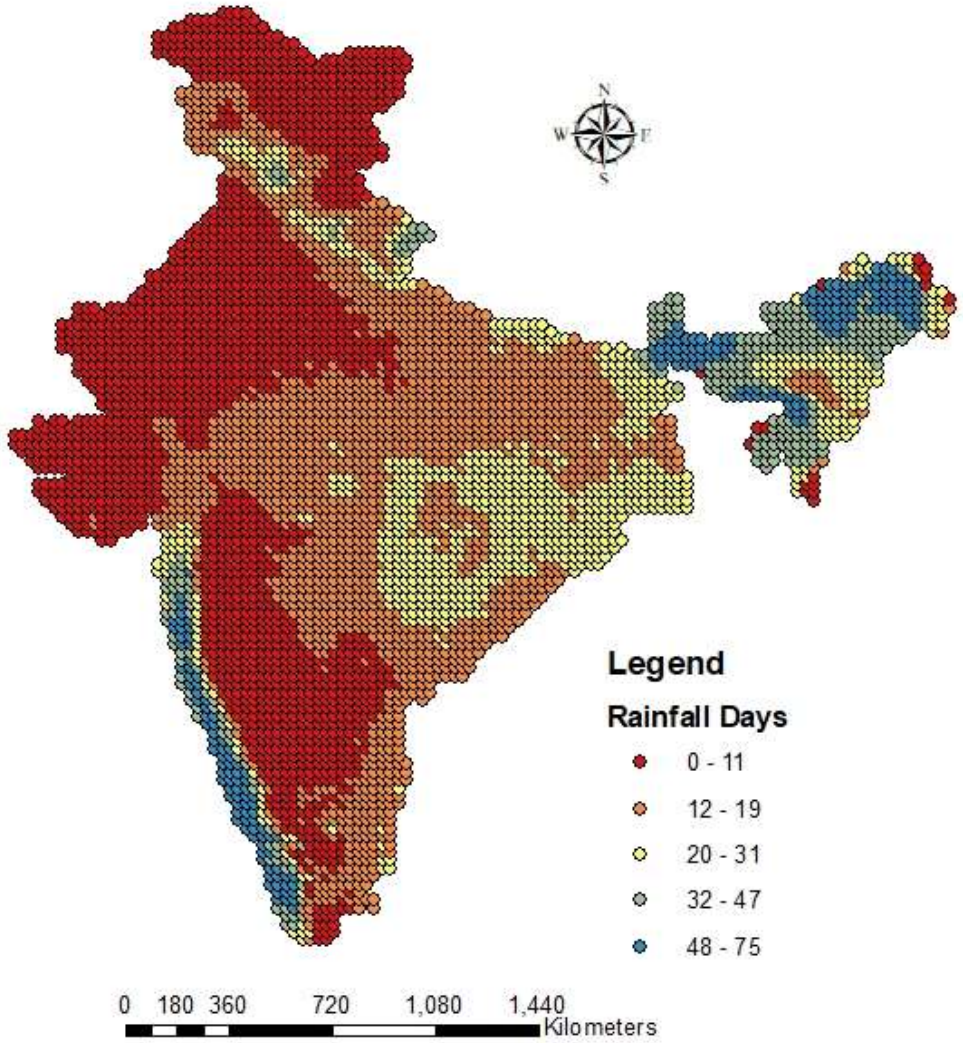
Managing its Spatial and Temporal Distribution over the Year

&

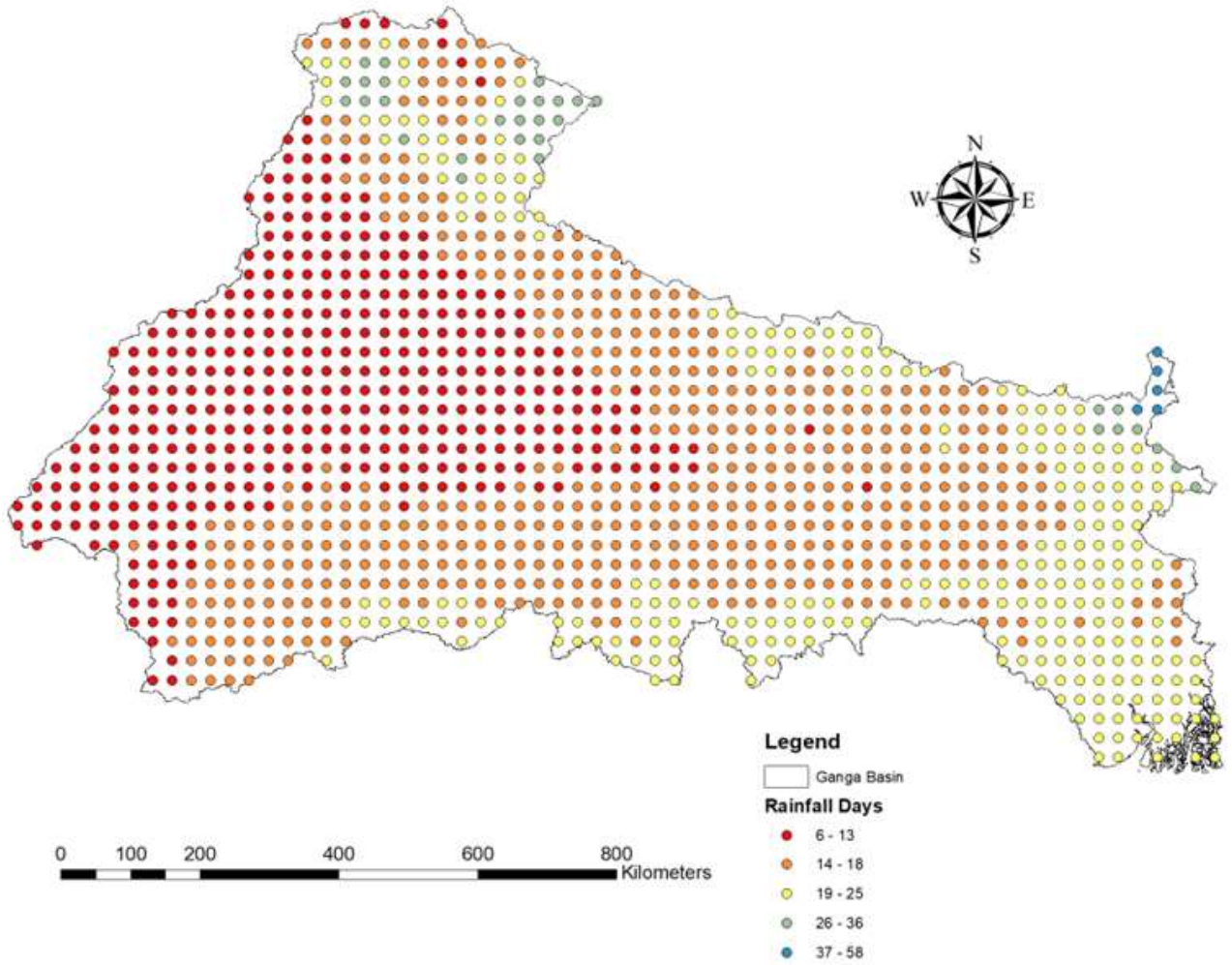
Quality of Water

Dr Vinod Tare
Founding Head – cGanga

Distribution of Number of Rainy Days

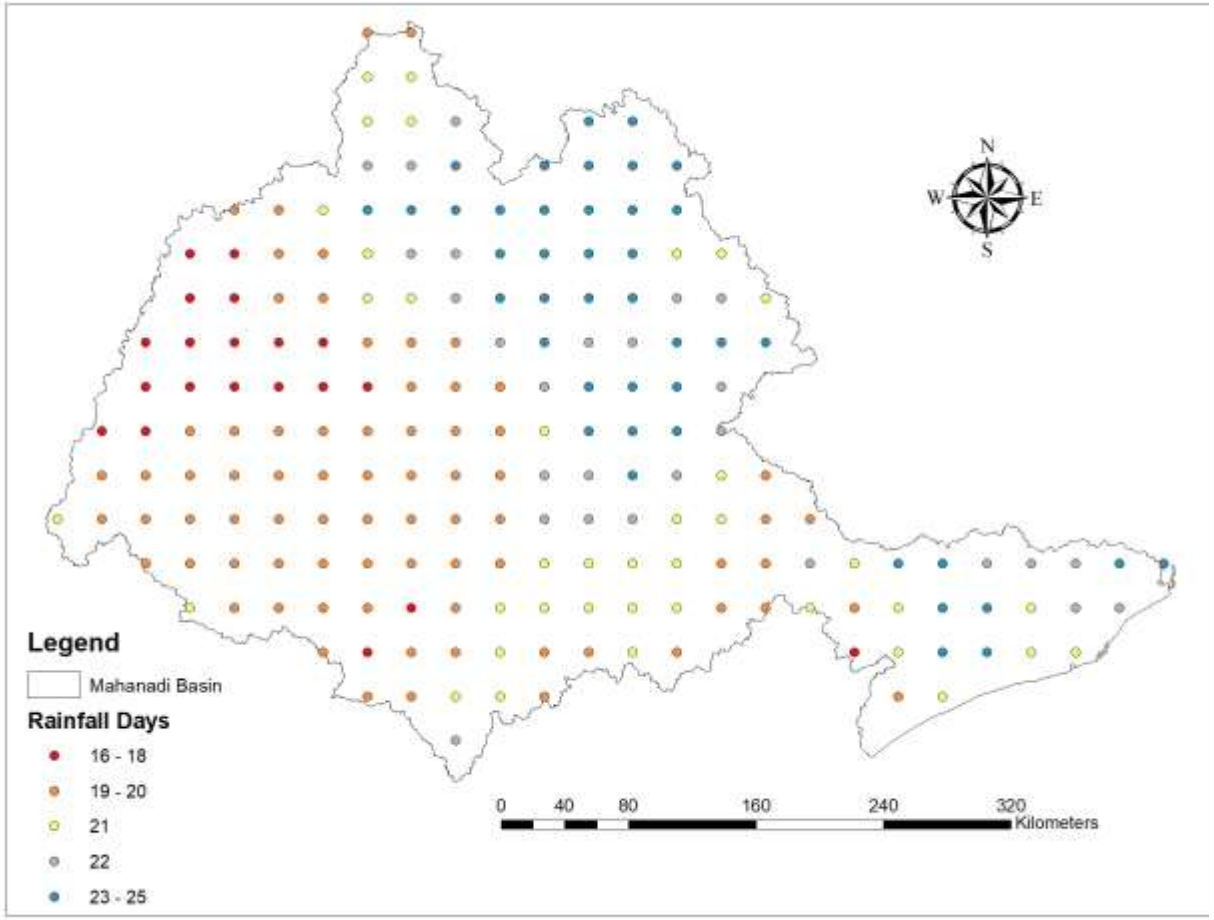


India

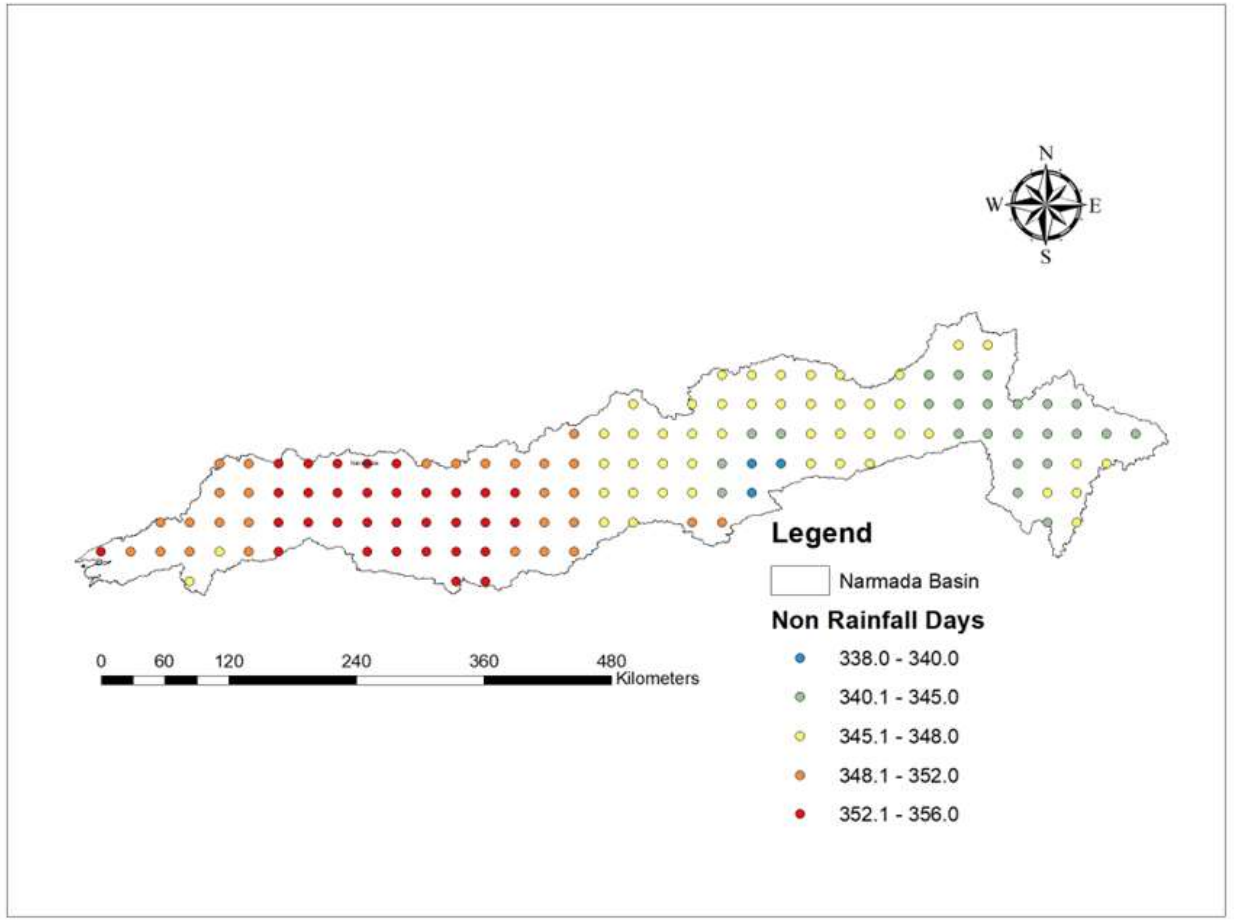


GangaBasin

Distribution of Number of Rainy Days

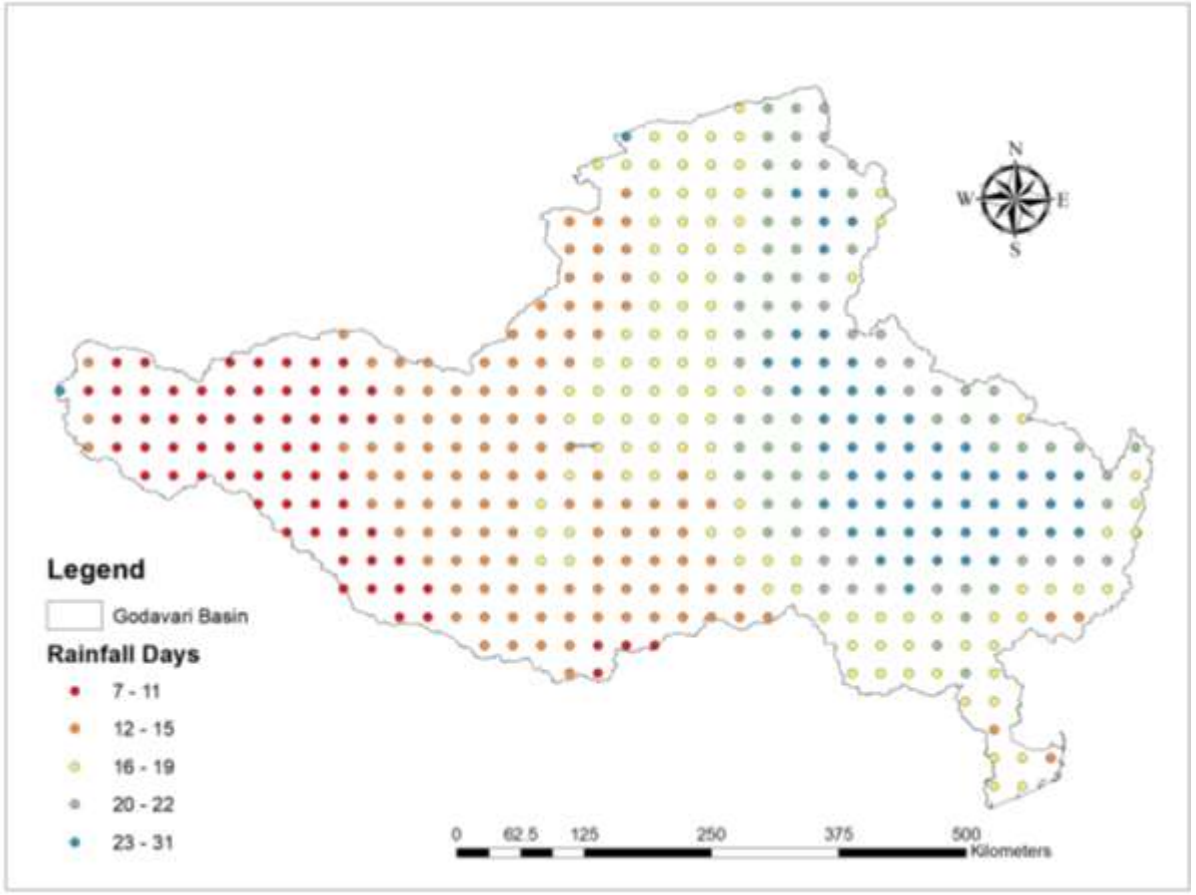


Mahanadi Basin

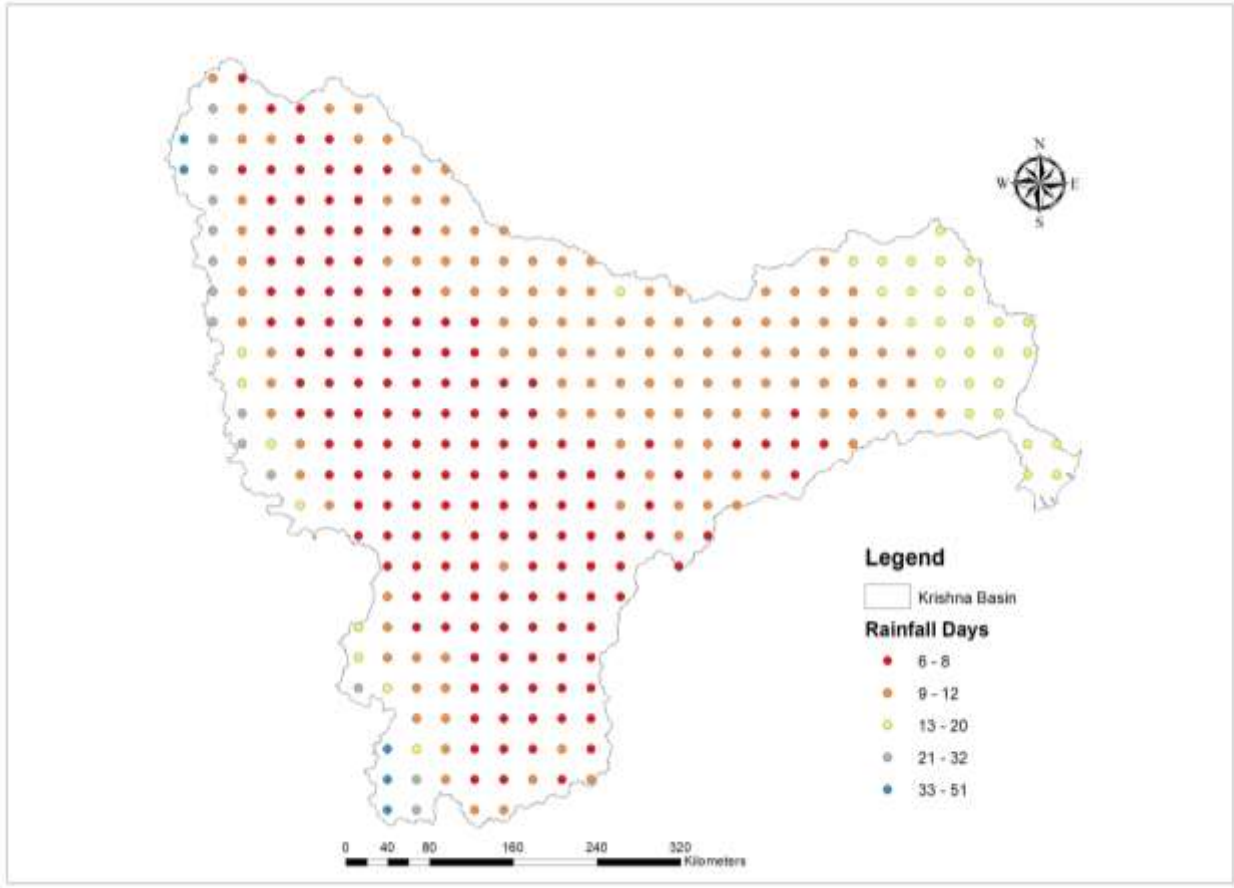


Narmada Basin

Distribution of Number of Rainy Days

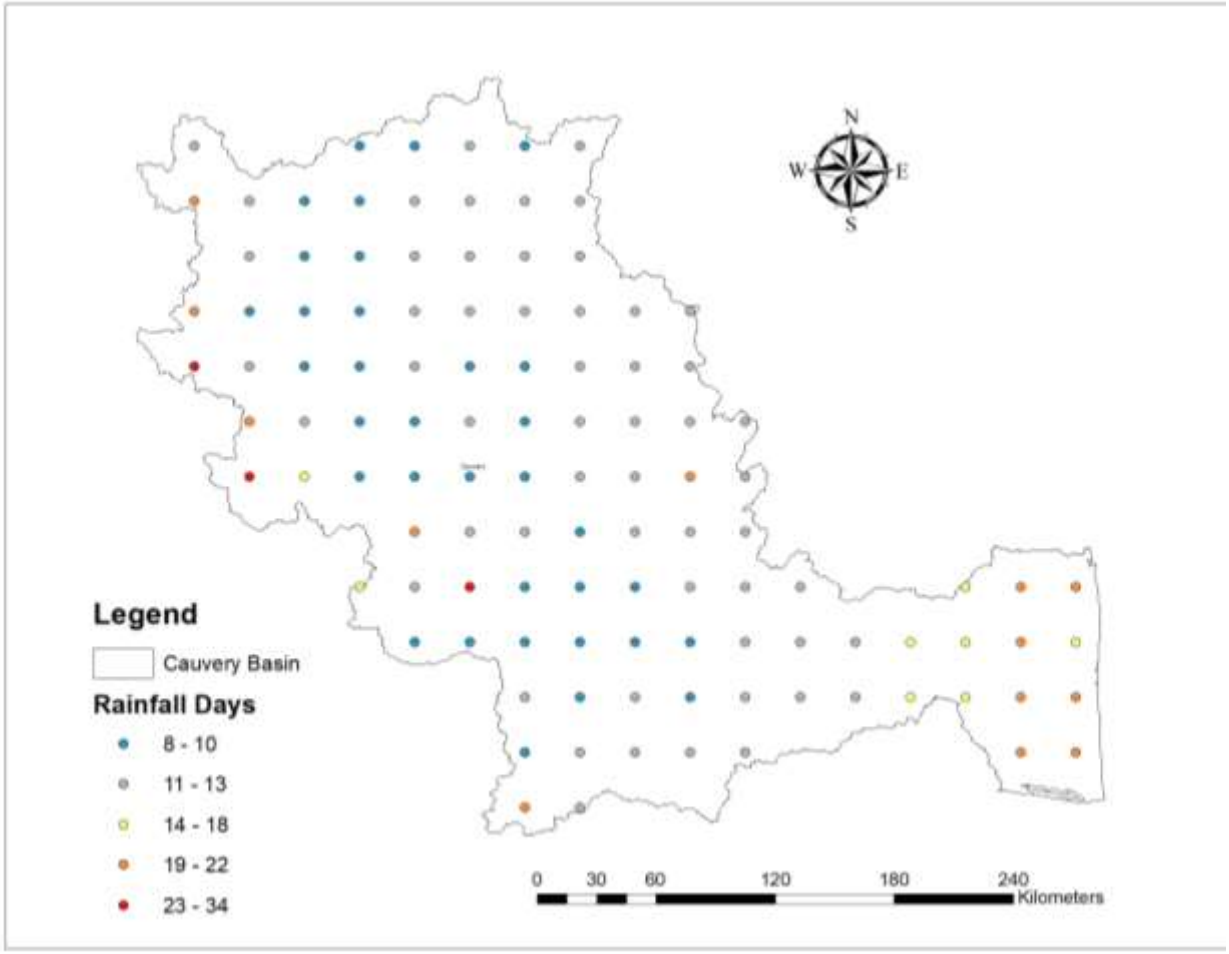


Godavari Basin

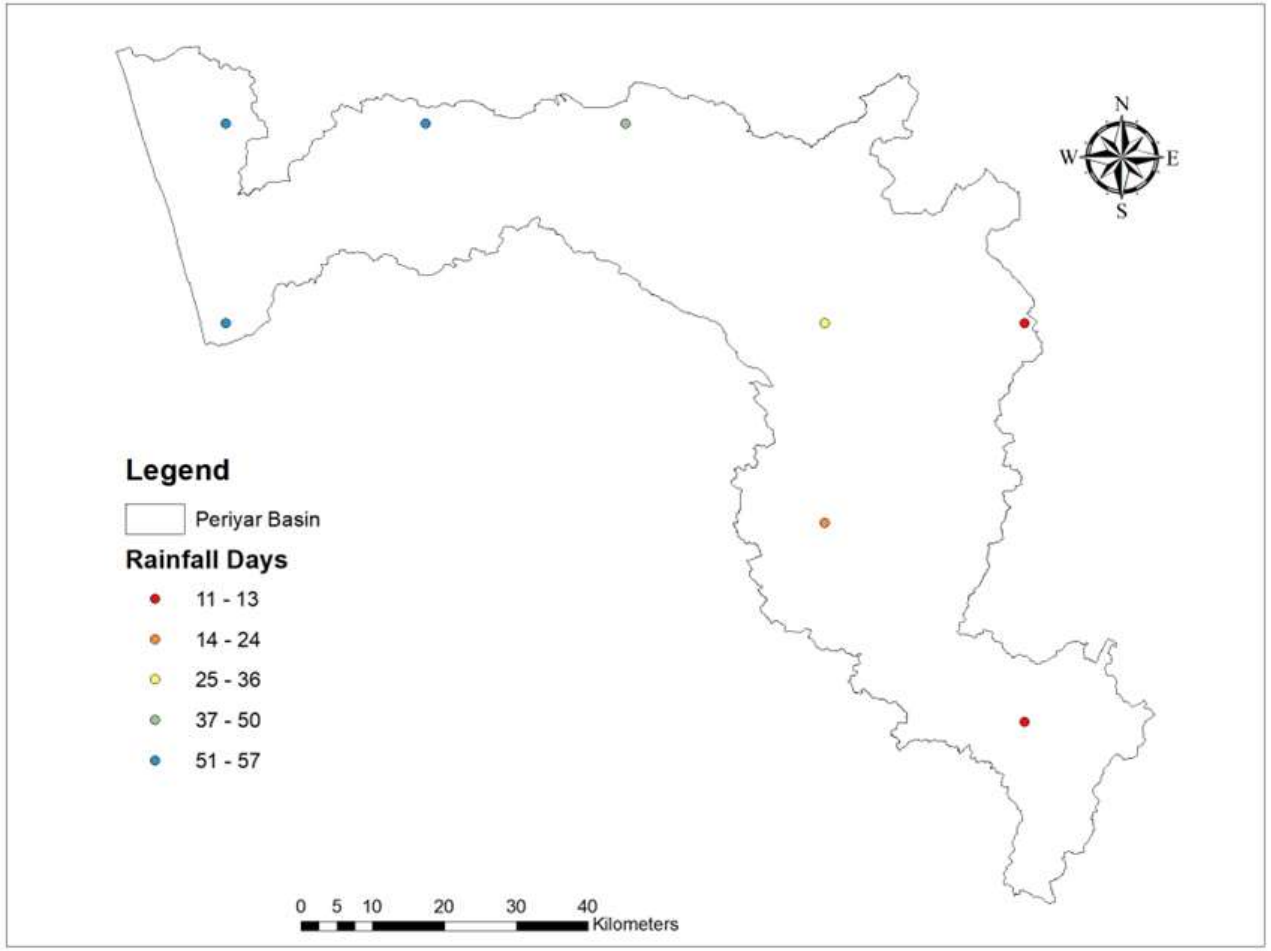


Krishna Basin

Distribution of Number of Rainy Days



Cauvery Basin



Periyar Basin

River Basin Management Plan

Key Points

- Performing Human Activities to Retain Capabilities of Rivers to carry out their functions and processes to deliver ecosystem services for generations to come
- 330 – 35 Plan / 90 – 10 Plan
- Brown and Black Water Bodies to Blue Water Bodies
- Rural and Urban River Management
- Closing the Water Loop at an Appropriate Scale through Reuse & Recycle
- Convert Rapid Flow to Sluggish Flow → Interconnection of Water Bodies at local scale
- Planning for infrastructure for draining (dredging, desilting, scrapping, skimming, pumping), conveyance (sewage & storm water), sewage treatment, segregation, degradation, reuse and recycle (of treated wastewater & solid residues), etc.
- Recognise Close Association of Land and Water

Dr Vinod Tare
Founding Head – cGanga

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Samarth Ganga (Capable Rivers)

- A river which can perform most of its processes and deliver on many of its functions sustainably
- Deliver on our commitments towards UN SDG

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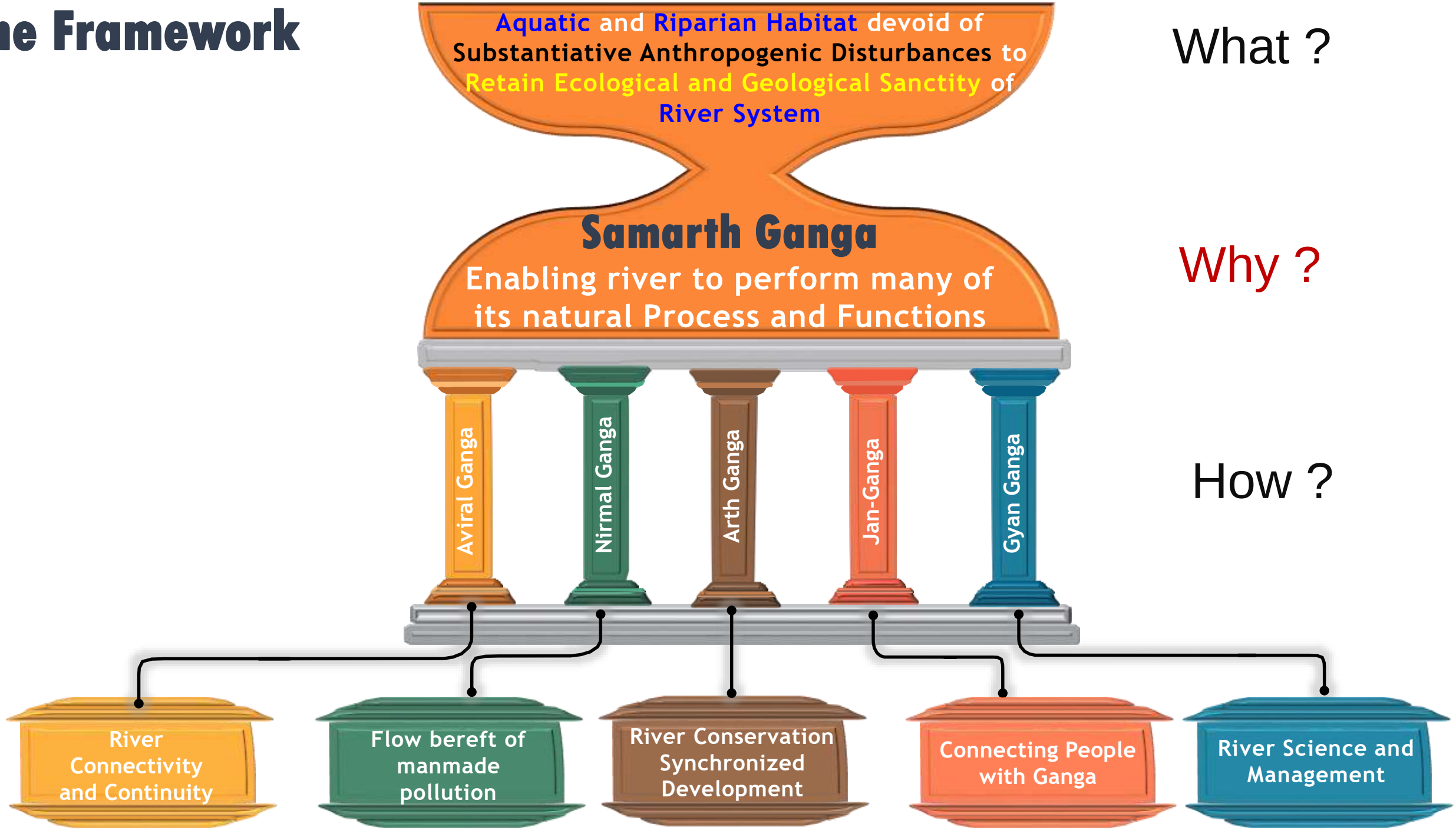
Ganga

- A Biophysical entity that originates in Himalaya and merges in Indian Ocean
- Symbol of rivers and represents culture of rivers in the region, particularly in India

The Framework



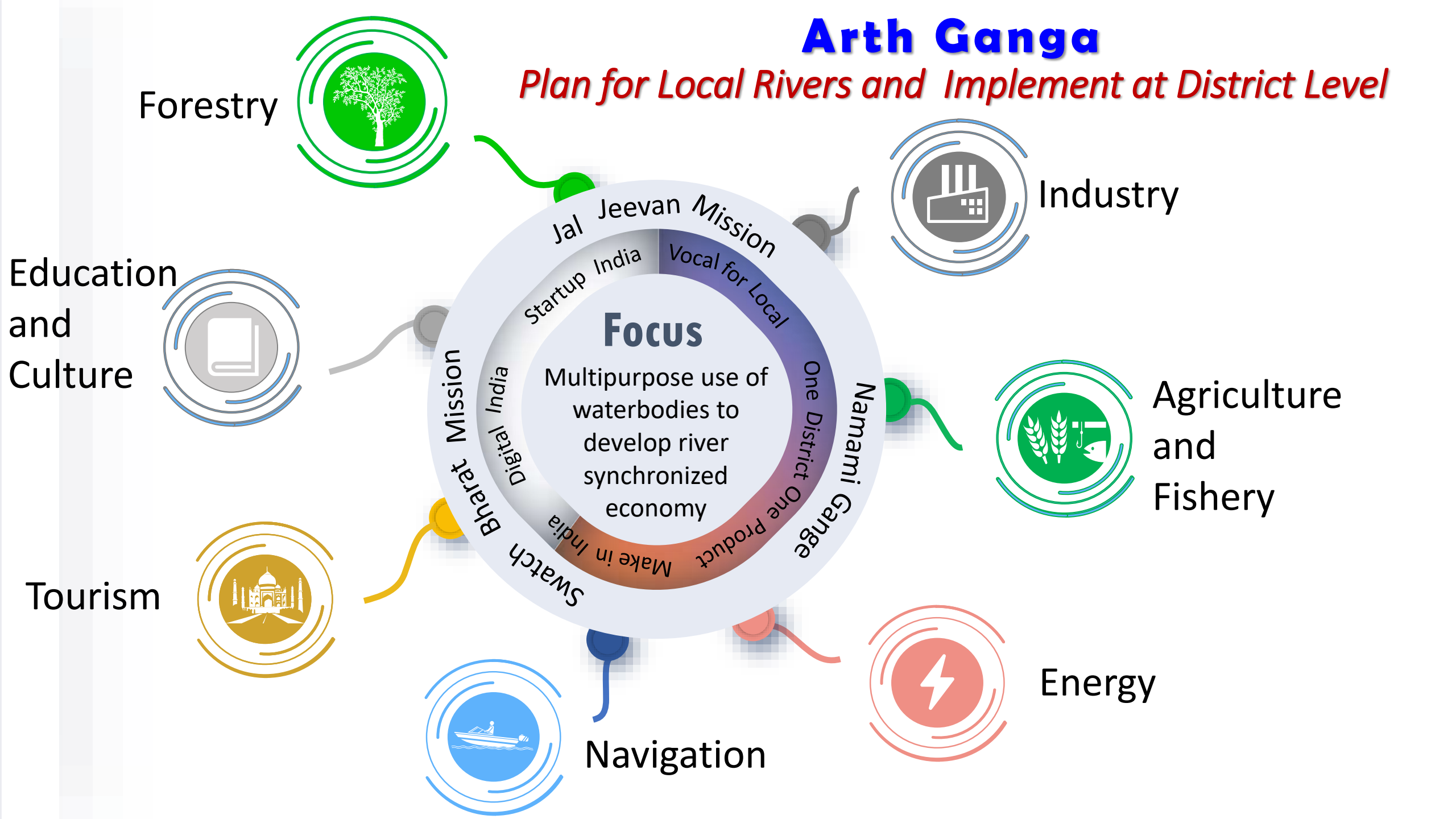
What ?

Why ?

How ?

Arth Ganga

Plan for Local Rivers and Implement at District Level



Towards Samarth Ganga

cGanga

Principal Components

1. River Health
2. River Monitoring
3. Circular Economy

Enabling Components

4. Data & Information
5. Technology & Innovation (Novel and Nobel Solutions ETV)
6. Economics, Finance and Investments

Impact Component

"Arth Ganga"

- Science, Technology & Engineering
- Policy & Law
- Governance
- Economics, Finance & Investments

Engagement Component

Advocacy, Outreach and Stakeholder Engagement

Deliverables

S No	Report/Dataset	Timeline
1	River at a glance	Quarter 1
2	Identification of critical stretches in all important rivers of the basin and salient action points for restoration and conservation	Quarter 4
3	Basin Demography	Quarter 2
4	River Atlas	Quarter 4
5	Waterbodies Atlas	Quarter 6
6	Land Use/Land Cover	Quarter 7
7	Biological Profile of Basin	Quarter 7
8	Climatologic/ Meteorological Data	Quarter 4
9	Lithological profile	Quarter 3
10	Hydraulic data	Quarter 3

Deliverables

S No	Report/Dataset	Timeline
11	Hydrologic data	Quarter 3
12	Physio-chemical and Biological Profile	Quarter 7
13	Water Demand and Supply Report	Quarter 5
14	Industrial profile Report	Quarter 7
15	Pollution load Report	Quarter 6
16	Agricultural Profile	Quarter 5
17	Geological Profile	Quarter 4
18	Aerial/ drone surveys, Aerial photographs	Quarter 2
19	Topographic maps	Quarter 4
20	Revenue map	Quarter 4
21	Infrastructure and Planning Report	Quarter 3

Deliverables

S No	Report/Dataset	Timeline
22	Geomorphological Map	Quarter 3
23	Water Balance/ Accounts/Budget as per delineated administrative and natural boundaries	Quarter 7
24	Hydrological Model	Quarter 7
25	Hydraulic Model	Quarter 6
26	E-Flows Assessment Report	Quarter 9
27	Sediment budget Report	Quarter 9
28	Climate Change Assessment Report	Quarter 6
29	Pollutant source map	Quarter 6
30	Management plan for domestic wastewater	Quarter 9
31	Management plan for industrial wastewater	Quarter 9

Deliverables

S No	Report/Dataset	Timeline
32	Management plan for solid waste	Quarter 9
33	Plan for rejuvenation of water bodies	Quarter 9
34	Mapping of agricultural runoff and nutrient cycling	Quarter 9
35	Identification of major threats and challenges for attaining Nirmal Dhara	Quarter 8
36	Mapping of various stakeholders, schemes, and economics involved	Quarter 9
37	Mapping of best practices in Solid-Liquid waste management – National and International	Quarter 8
38	Report on Identification of the major threats to biodiversity in the basin, management, conservation challenges and measures of restoration	Quarter 9

Deliverables

S No	Report/Dataset	Timeline
39	Assessment of gross agricultural structure of the basin	Quarter 7
40	Nutrient and sediments load management	Quarter 7
41	Agricultural management practices	Quarter 9
42	Map of suitable locations for forestation, orchards and organic farming	Quarter 8
43	Identification of agricultural factors affecting the river and proposed corrective measures	Quarter 11
44	Mapping of the potential natural and anthropogenic threats to the geological base of river basin	Quarter 9
45	Groundwater exploitation and status	Quarter 9
46	Identification of the major threats and challenges for safeguarding a geological repository	Quarter 9

Deliverables

S No	Report/Dataset	Timeline
47	Flood hazard model	Quarter 5
48	Landslide susceptibility map	Quarter 6
49	Identification of the major threats and challenges for basin protection from natural disasters	Quarter 8
50	Bank erosion model	Quarter 6
51	Flood hazard model and map	Quarter 6
52	Flood management techniques	Quarter 7
53	Identification of the major threats and challenges for rivers	Quarter 8
54	Learnings from the work done in other Indian basins	Quarter 4
55	Learnings from the work done in other International basins	Quarter 4
56	Approaches and activities to river-people connect	Quarter 4

Deliverables

S No	Report/Dataset	Timeline
57	Legal constraints such as inter-state agreements	Quarter 4
58	Social environment (water-related institutions, interest groups, public awareness)	Quarter 4
59	Developing Protocol for Initiating Monitoring and Feedback of Various Implementation Strategies/ Plans/ Programmes/ Projects	Quarter 4
60	Designing a pilot for initiating Monitoring and Feedback	Quarter 6
61	Implementing pilot(s) for Monitoring and Feedback	Quarter 12

Identification of Issues

Issue	Code
Dry Channel	1
Fragmented Channel	2
Encroachment	3
Siltation	4
Deposition on Banks	5
Bank Erosion	6
Solid Waste Accumulation	7
Water Hyacinth/ Aquatic Weeds	8
Algal Bloom	9
Sewage Discharge	10

Issue	Code
Industrial Effluent Discharge	11
Adjacent Ponds (Dry or Partially Filled)	12
Stagnant Water Pools in Riverbed	13
Narrow Channel	14
Water Logging	15
Oxbow Lake (Dry or Partially Filled)	16
Poor Water Quality (Brown, Black colour, Foul smell)	17
Channel Diversion	18
Sand Mining	19

Issues and Potential Interventions through MGNREGA

Suggested Actions	Code
De-siltation through manual scrapping/excavation	A
Plantation of appropriate species (mostly indigenous) beyond the boundaries of 3 years return-flood	B
Channel widening	C
Channel deepening to establish connectivity	D
Stabilization of banks with or without grasses/shrubs	E
Pond Cleaning/Desilting	F
Re-establishing original channel path	G
Harvesting of Aquatic Weeds including Water Hyacinth	H
Chopping/Crushing of Aquatic Weeds	I
Harvesting of Algae	J
Removal of solid waste, segregation, and processing	K
Aerobic/Anaerobic Composting with or without mixing domestic and animal solid waste	L
Stopping unauthorised activity and removing unauthorised installations	M
Treatment of wastewater with nature-based bioremediation techniques	N
Scope beyond MGNREGA and/or requiring support from other programmes	O

“Arth Ganga: River Conservation Synchronized Development”

“अर्थ गंगा: नदी संरक्षण समन्वित विकास”

Faith Leaders, CSO

High on Traditional Knowledge & Wisdom
Long Term Perspective

Industry, Business, Contractor Groups
High on Modern Science
Short & Medium Term Perspective

Guiding Principles

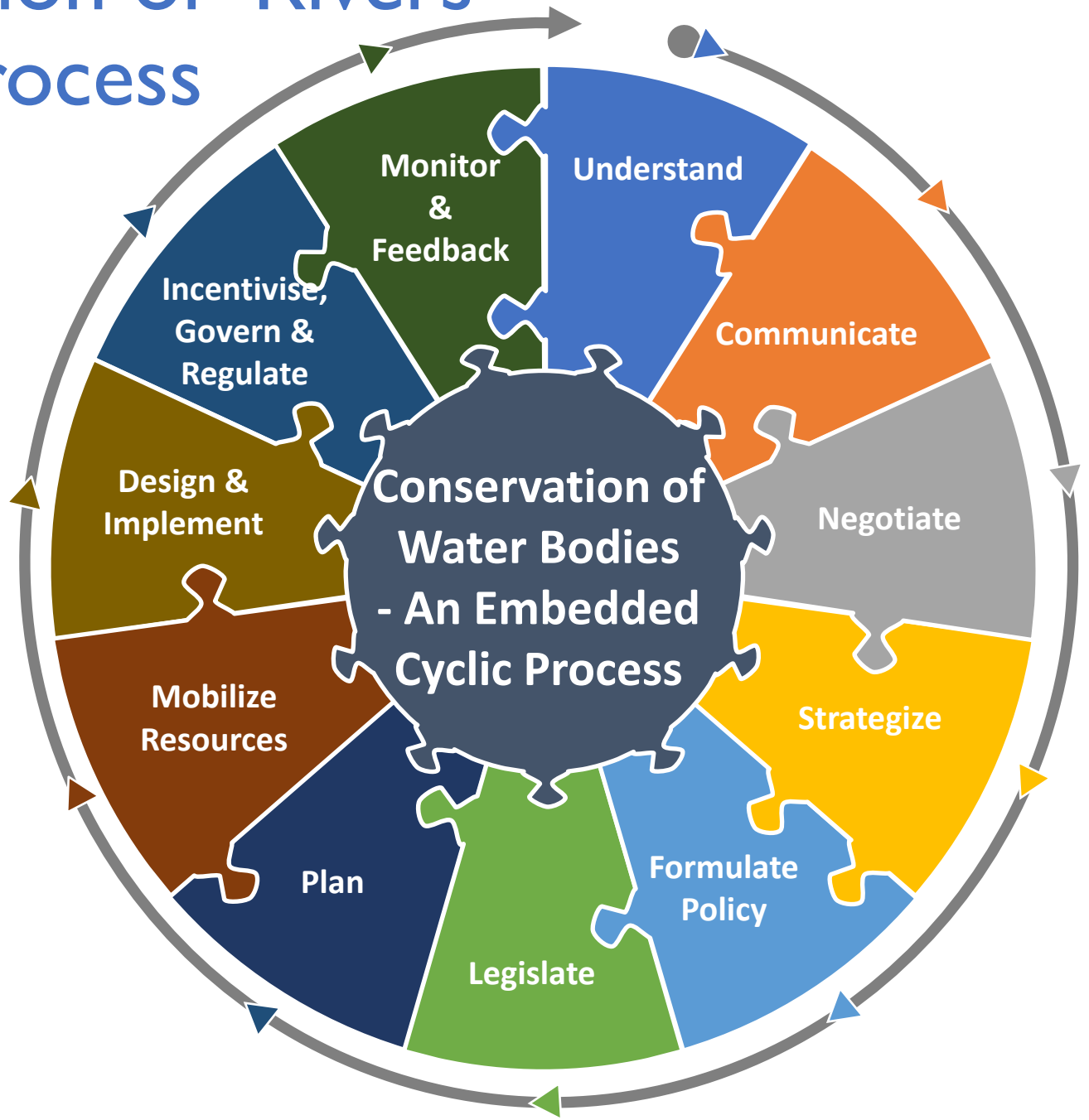
1. Apply Modern Science & Technology with Traditional Wisdom;

2. Think Globally but Start Acting Locally;

3. Believe in Vasudhaiv Kutumbkam (**वसुधैव कुटुम्बकम्**) but participate in preparing, implementing and monitoring a Bottom-up action plan

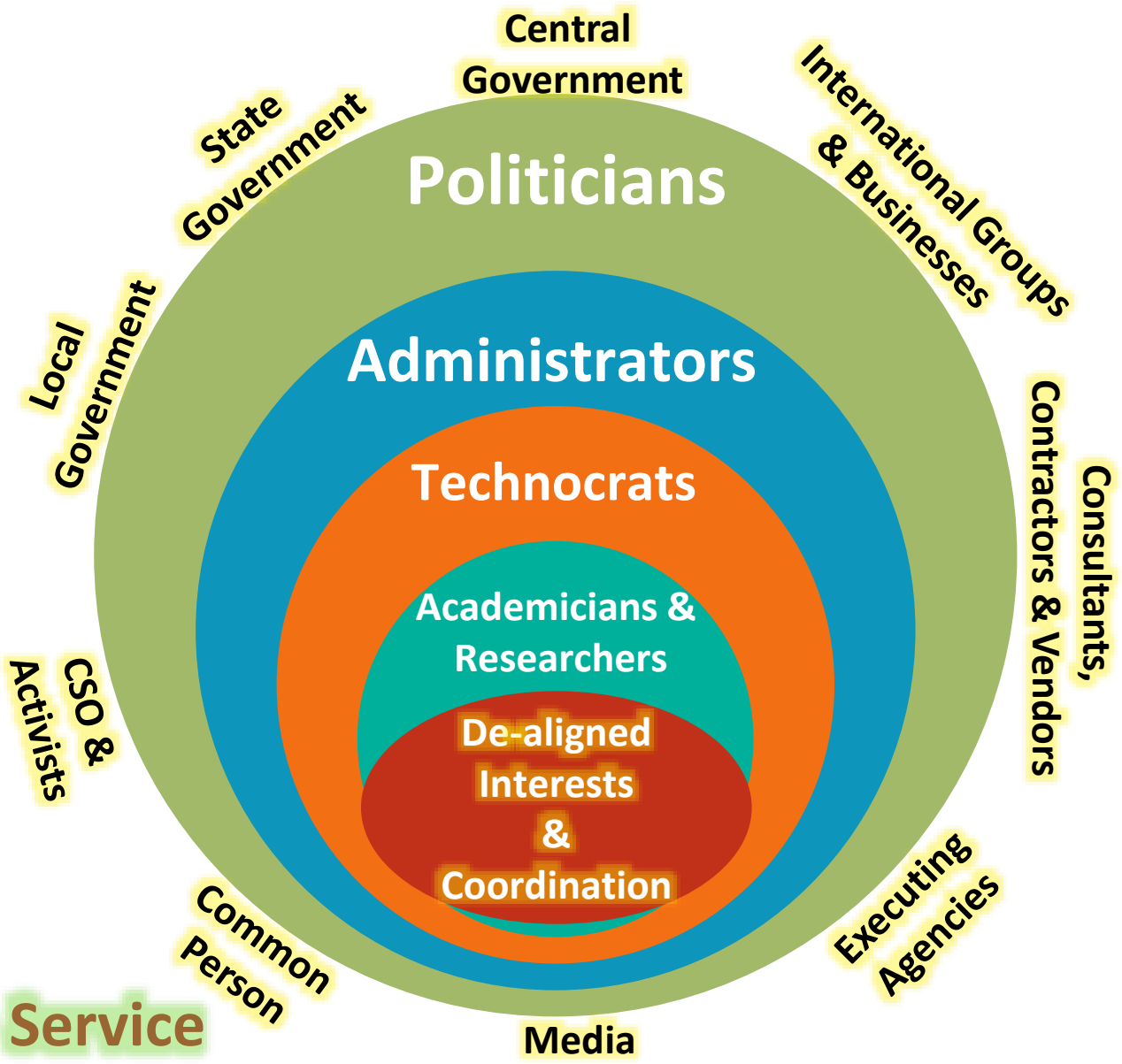
Rejuvenation & Conservation of Rivers — An Embedded Cyclic Process

- Understanding
- Communication
- Negotiation
- Strategizing
- Formulating Policies
- Legislations
- Planning
- Identification of Responsive Agencies, Institutions, Individuals, etc. & Mobilization of Resources
- Design & Implementation
- Incentives, Governance & Regulation
- Monitoring & Feedback



Development and River Conservation:
Implementation Challenges

Managing Interests of Diverse Set of Stakeholders & Actors



Residence Time & Interest

Elderly/Superannuated or Young/Active Service

Portfolios

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cGanga Portfolios and Domains

1. River Health
- 1.1 Geomprphology
- 1.2 Hydrology
- 1.3 Water Quality
- 1.4 Biological Profile
- 1.5 Revaluates & Streams
- 1.6 Wetlands
- 1.7 Lakes
- 1.8 Reservoirs

2. Land and Water Resources
- 2.1 Inventory
- 2.2 Accounts
- 2.3 Audit

3. Historical, Mythological, Social & Cultural Aspects
- 3.1 Historical Aspects
- 3.2 Mythological Aspects
- 3.3 Social Aspects
- 3.4 Cultural Aspects

4.River High Impact Activities
- 4.1 Agriculture
- 4.2 Hydro Power
- 4.3 Navigation
- 4.4 Sand Mining
- 4.5 Fishing

5. Waste Management
- 5.1 Domestic
- 5.2 Commercial
- 5.3 Industrial
- 5.4 Rural
- 5.5 Urban

6. "Arth" Ganga
- 6.1 Ecosystem Services
- 6.2 Spiritual Aspects

7. Data & Information Management
- 7.1 Collection
- 7.2 Cleaning & Archiving
- 7.3 Analytics
- 7.4 Dissemination

8.Novel & Noble Approaches
- 8.1 Novel Approaches
- 8.2 Noble Approaches

9. Policy, Law & Governance

10. Advocacy & Outreach
- 10.1 Advocacy
- 10.2 Outreach

Approach

Overview &
Strategic Planning

River Basin at a Glance

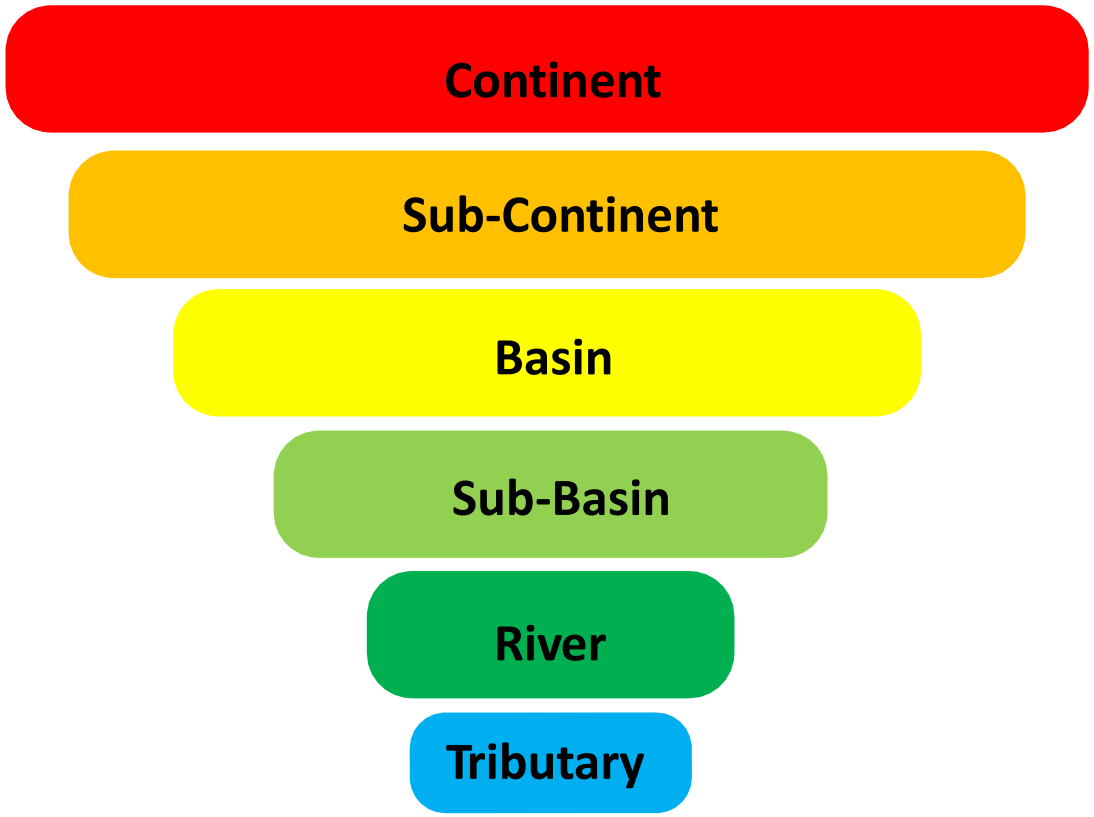
Implementation

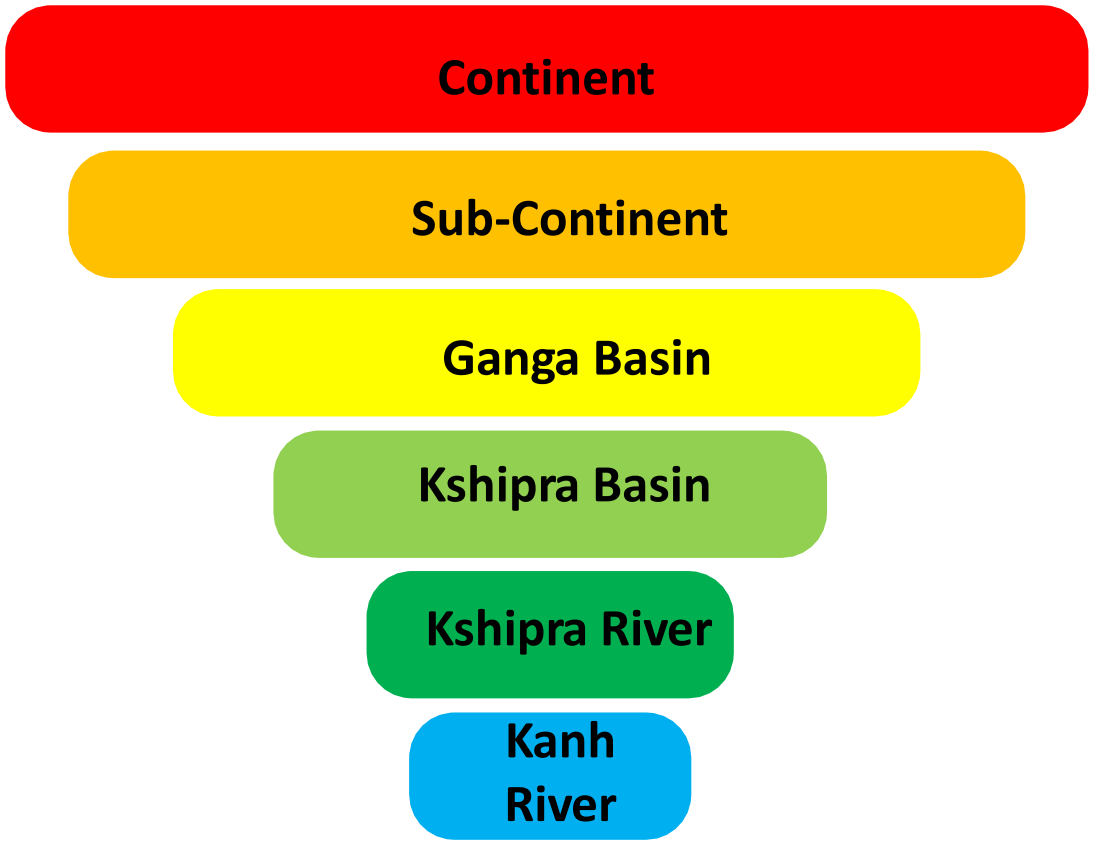
Can Only Start
from the Base

Approach

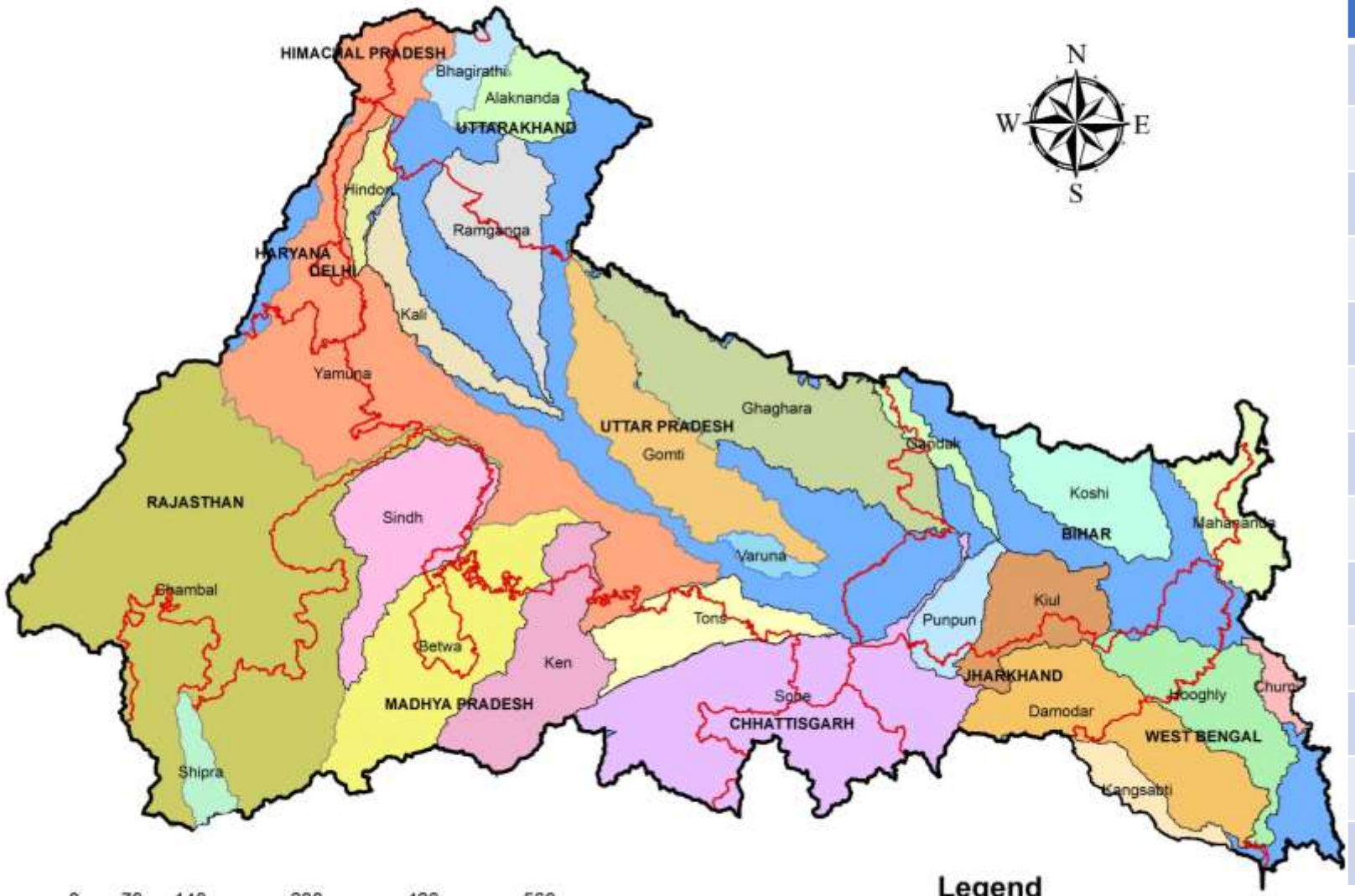
cGanga

Studies & Planning: Natural Boundaries



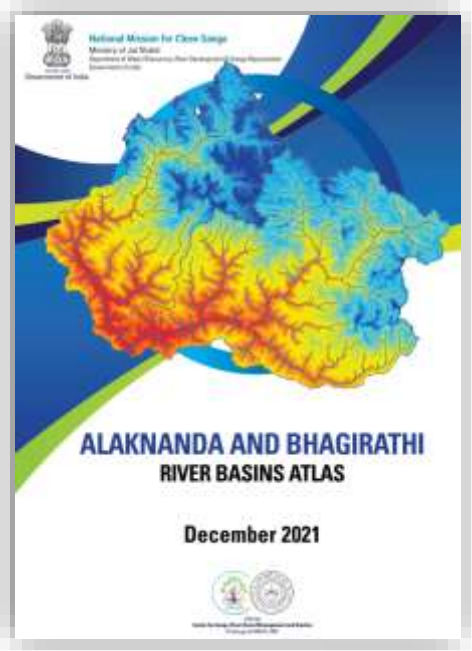


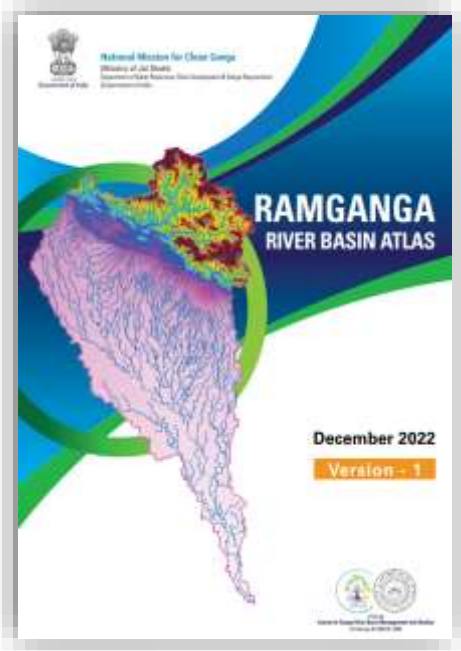
Unit: A River which is Perineal or has a Potential to be Perineal

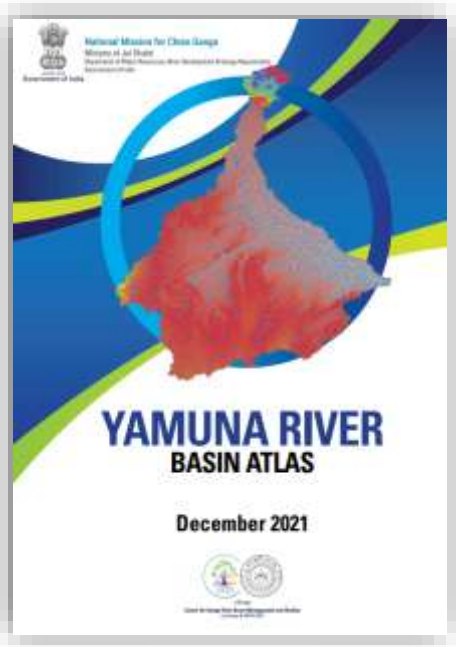


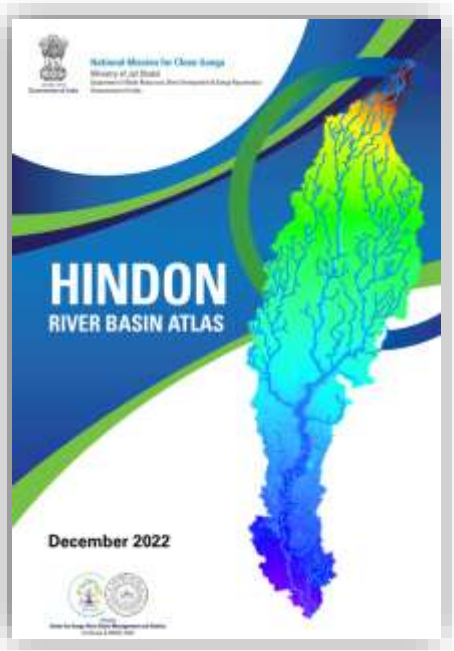
S No	River Basin	S No	River Basin
1	Alakananda	14	Kangsabati
2	Betwa	15	Ken
3	Bhagirathi	16	Kiul
4	Chambal	17	Koshi
5	Churni	18	Kshipra
6	Damodar	19	Mahananda
7	Gandak	20	Punpun
8	Ganga	21	Ramganga
9	Ghaghara	22	Sindh
10	Gomti	23	Sone
11	Hindon	24	Tons
12	Hooghly	25	Varuna
13	Kali	26	Yamuna

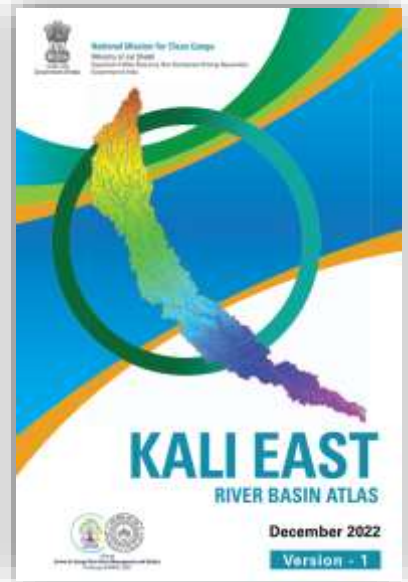
River Atlases – Natural Boundaries

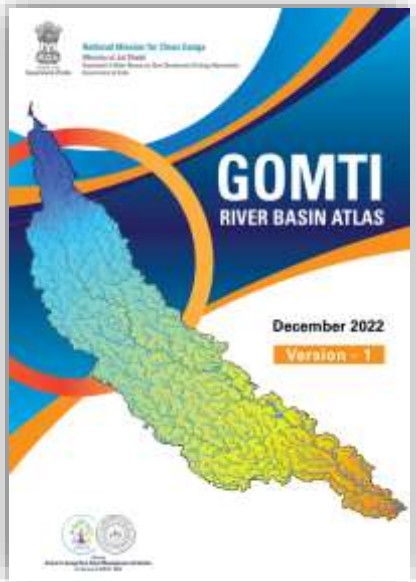












Approach

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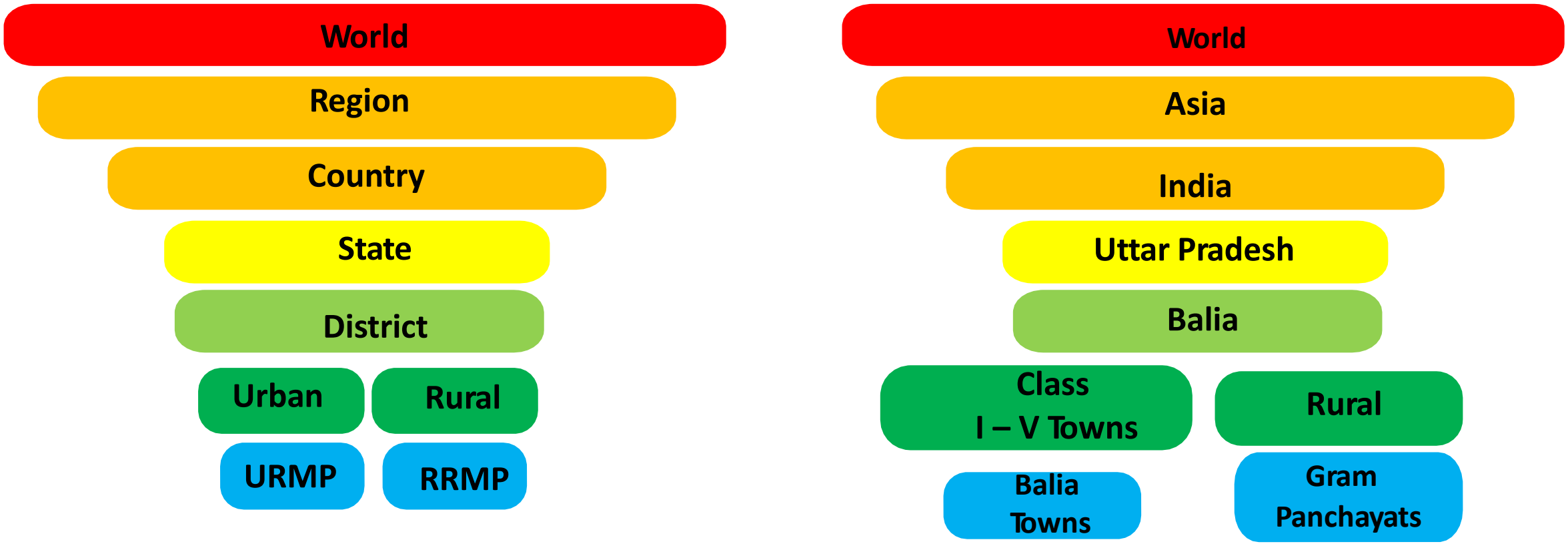
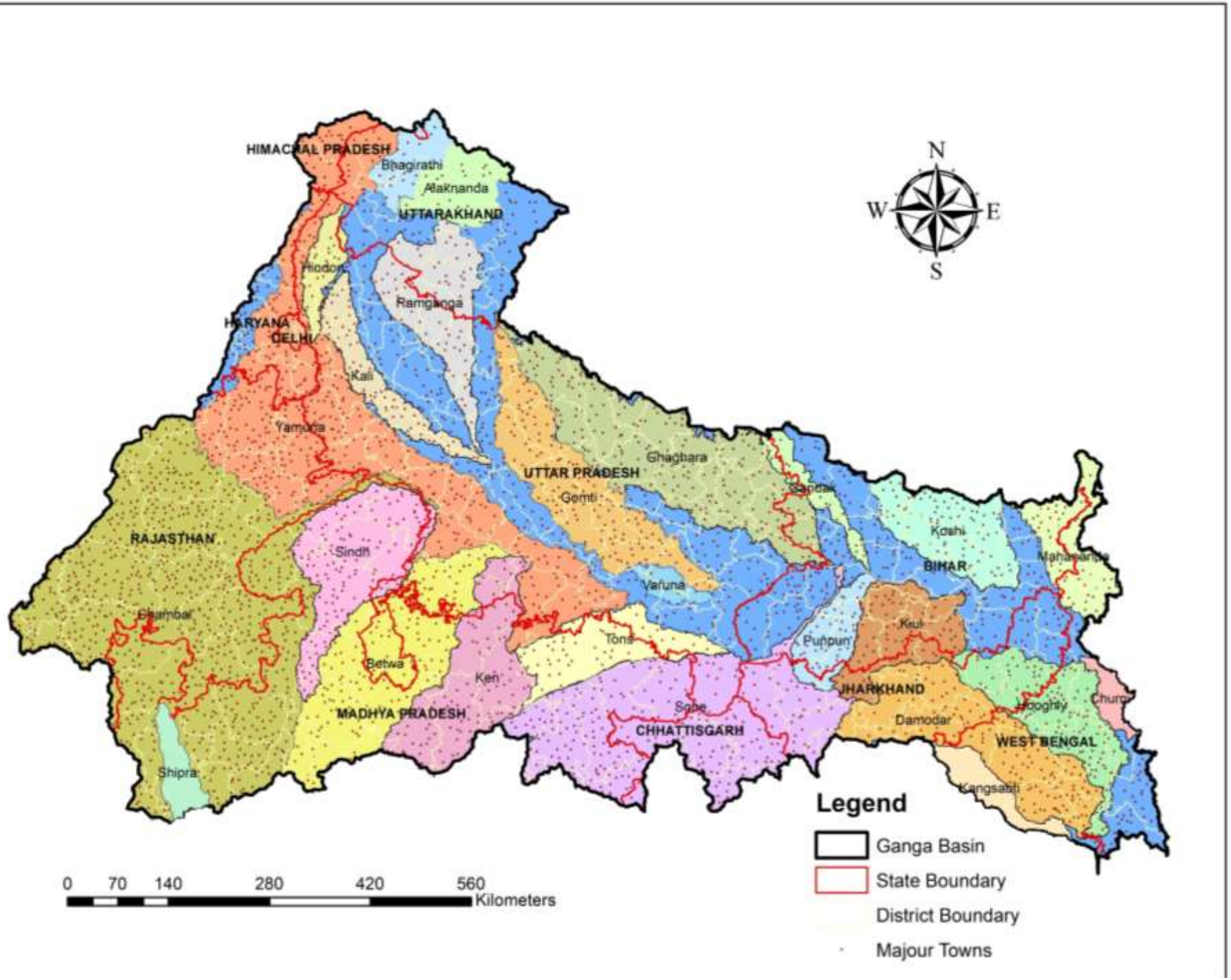
Implementation: Administrative Boundaries

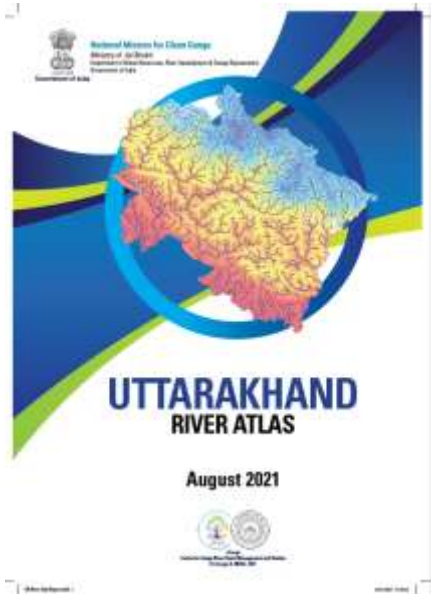


Unit: District → URMP & RRMP

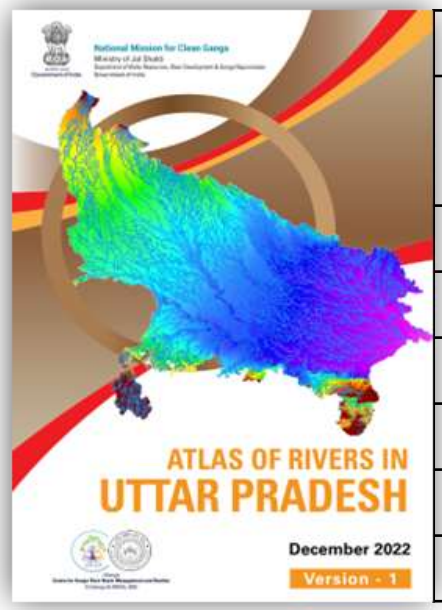


S No.	Details	No.s
1	States	11
2	Districts	265
3	Major Sub-Basins	26
4	Major Towns	4184

River Atlases – Administrative Boundaries

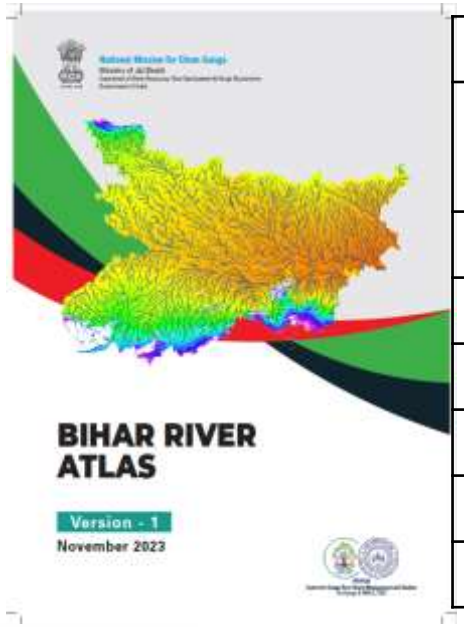


- 53,483 km^2 Basin
- 221 Rivers
- 10913 km Network
- 15 Dams
- 18 Barrages and Weirs
- 31 CWC sites



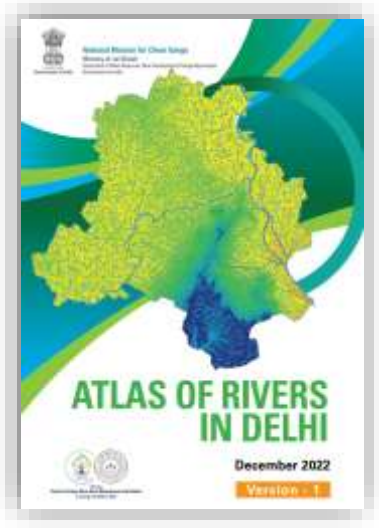
UTTAR PRADESH	
River Length	No. Of Rivers
<1 km	96
1 to 5 km	812
5-10 km	889
10-15 km	452
>15 km	938
Total	3187

- 2,32,444 km^2 Basin,
- 3,187 Rivers
- 62,322 km Network,
- 110 Dams;
- 32 Barrages and Weirs,
- 92 CWC sites,
- 59,200 km Canal network



Bihar	
River Length	No. Of Rivers
<1 km	5
1 to 5 km	168
5-10 km	180
10-15 km	115
>15 km	396
Total	864

- 1,16,469 km^2 Basin
- 864 Rivers
- 28619 km Network
- 24 Dams
- 39 Barrages and Weirs
- 52 CWC sites
- 18079.79 km Canal network



Data and Information
Date and Information Framework

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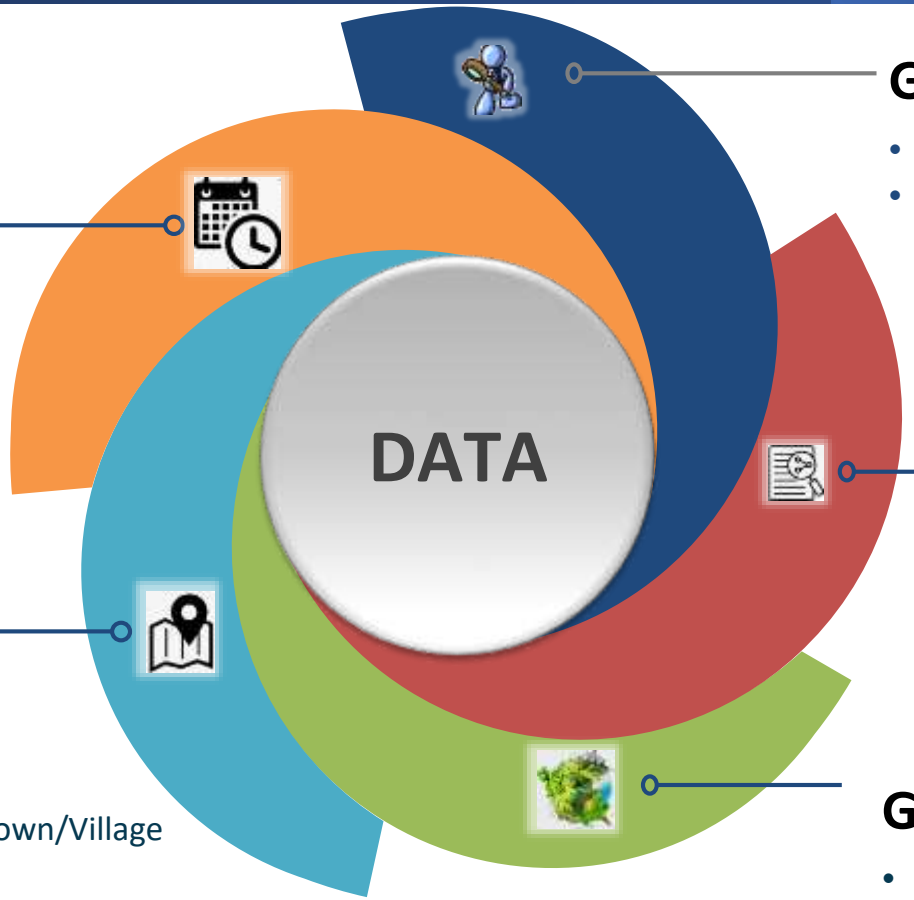

Gathering Techniques

- Remote Sensing
- Field Investigation

Temporal Information

- Discrete
- Series

Category

- Raw /Measured
- Interpolated
- Extrapolated
- Modeled and Simulated

Location

- **Natural Delineation**
  - Continent→ River Basin→ River
- **Administrative Delineation**
  - Country→ State → District → City/Town/Village

Geographic

- Physiography
- Human Geography

Management can not be without measurement, budgeting and accounting

→ Water Budget and Accounting at the District Level

Data and Information Framework

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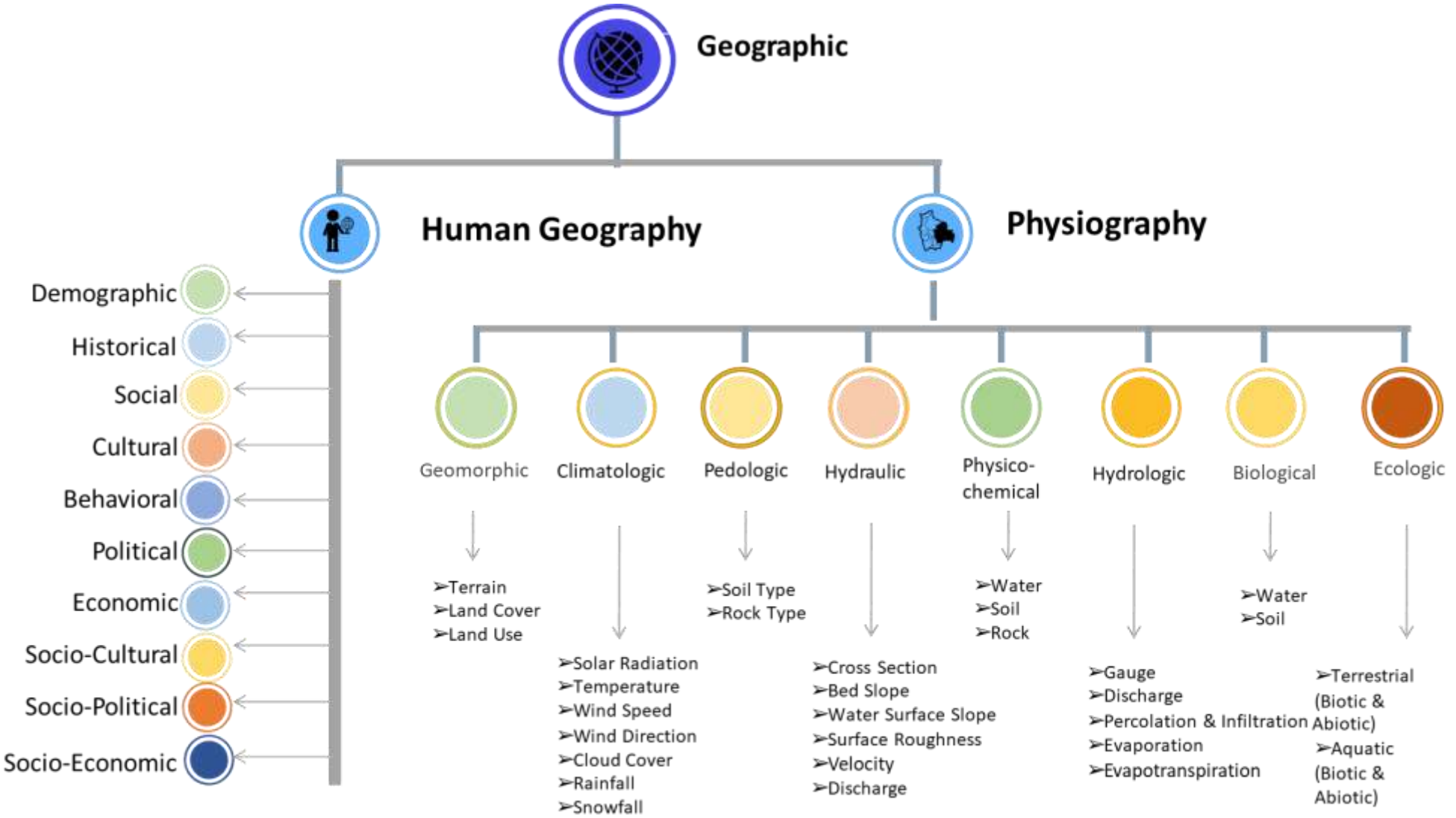


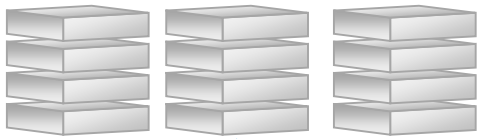
Gyan Ganga: Virtual/Digital Library

Stakeholders

- ✓ Policy Makers
- ✓ Govt: Central/State/Local
- ✓ NGO/Civil Societies
- ✓ Researchers
- ✓ General Public
- ✓ Tourists
- ✓ Spiritual Leaders
- ✓ Religious Leaders
- ✓ Historians
- ✓ Socialists
- ✓ Lawyers
- ✓ Administrators

Types

- ✓ Historical
- ✓ Economic
- ✓ Forests
- ✓ Water Resources
- ✓ Agriculture
- ✓ Energy/Power
- ✓ Recreational
- ✓ Navigation
- ✓ Floods
- ✓ Pollution
- ✓ Political
- ✓ Laws and Regulations
- ✓ Governance
- ✓ Geographical
- ✓ Geomorphological
- ✓ Ecological
- ✓ Environmental
- ✓ Social
- ✓ Cultural
- ✓ Mythological



Vision

Targets

Information

River Basin Information & Communication Network [RBIC]

festivals & events

video & photography

interviews & stories

Gangalore

news & views

facts & myths

Features

Gangapedia

www.gangapedia.in

External Social Site

Virtual Network Centre as Website

Links to

Gangalaya

www.gangalaya.in

Geospatial Data Management

Data

- Generation
  - Observations
  - Measurements
  - Photographs
- Representation
  - Graphs
  - Charts
  - Maps
  - Images
  - Movies
- Classification
  - temporal
  - spatial
- Category
  - classified
  - unclassified

Identification of Issues

Issue	Code
Dry Channel	1
Fragmented Channel	2
Encroachment	3
Siltation	4
Deposition on Banks	5
Bank Erosion	6
Solid Waste Accumulation	7
Water Hyacinth/ Aquatic Weeds	8
Algal Bloom	9
Sewage Discharge	10

Issue	Code
Industrial Effluent Discharge	11
Adjacent Ponds (Dry or Partially Filled)	12
Stagnant Water Pools in Riverbed	13
Narrow Channel	14
Water Logging	15
Oxbow Lake (Dry or Partially Filled)	16
Poor Water Quality (Brown, Black colour, Foul smell)	17
Channel Diversion	18
Sand Mining	19

Issues and Potential Interventions through MGNREGA

Suggested Actions	Code
De-siltation through manual scrapping/excavation	A
Plantation of appropriate species (mostly indigenous) beyond the boundaries of 3 years return-flood	B
Channel widening	C
Channel deepening to establish connectivity	D
Stabilization of banks with or without grasses/shrubs	E
Pond Cleaning/Desilting	F
Re-establishing original channel path	G
Harvesting of Aquatic Weeds including Water Hyacinth	H
Chopping/Crushing of Aquatic Weeds	I
Harvesting of Algae	J
Removal of solid waste, segregation, and processing	K
Aerobic/Anaerobic Composting with or without mixing domestic and animal solid waste	L
Stopping unauthorised activity and removing unauthorised installations	M
Treatment of wastewater with nature-based bioremediation techniques	N
Scope beyond MGNREGA and/or requiring support from other programmes	O

Healthy River Programme

Director, NRCD

Comments / Suggestions

Stakeholder Representatives

Closing Remarks by
Ms Debashree Mukherjee
Secretary, Do WR, RD & GR
Ministry of Jal Shakti, GoI

Vote of Thanks by Mr Pradeep Agarwal, JS, NRCD, Do WR, RD & GR, MoJS

Questions, Comments & Suggestions!

Questions, Comments & Suggestions may be sent to
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