



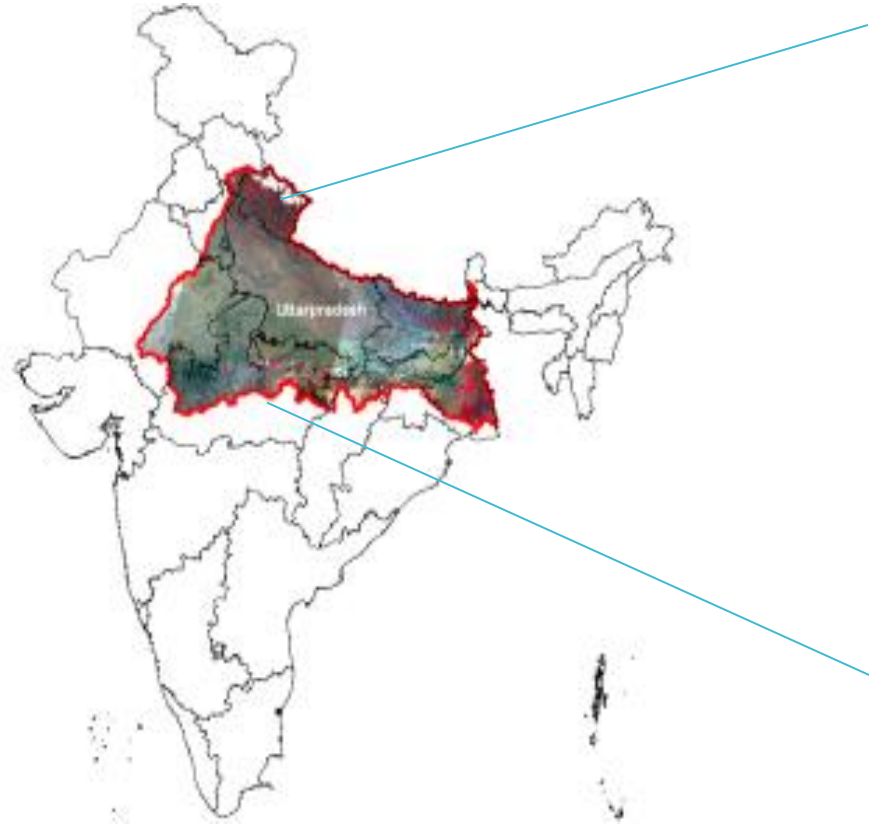
Centre for Ganga River Basin Management and Studies [CGanga]

Transforming Ganga | Valuing Water

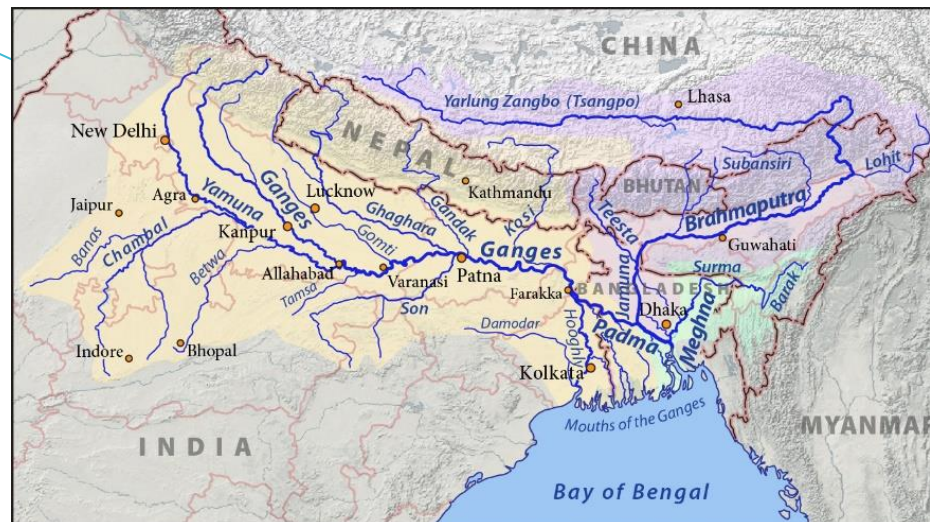
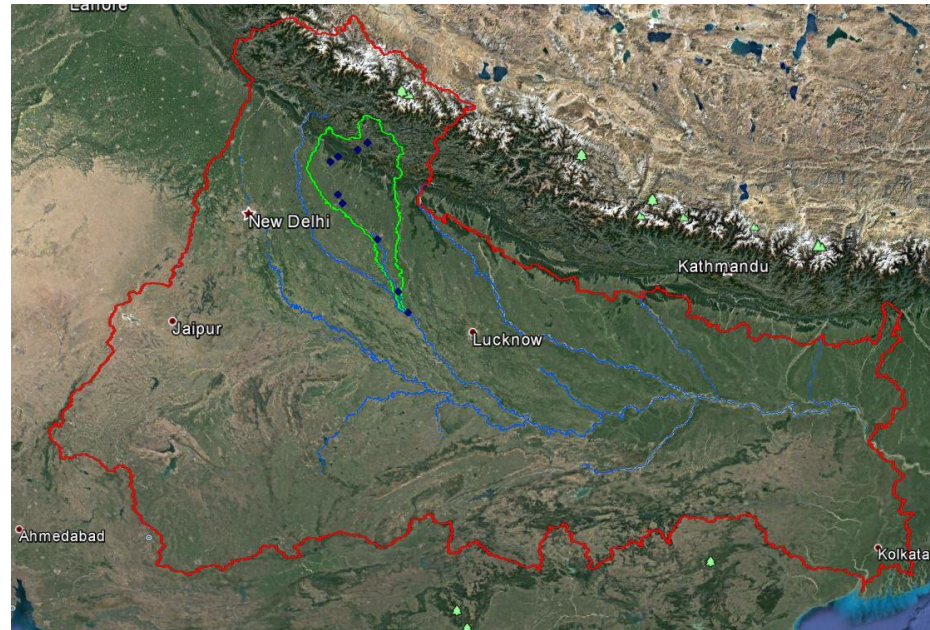
River Basin Management Need for a Multi-Disciplinary Approach

22 September 2017
Hamilton, New Zealand

Ganga River Basin



CGanga shall provide “Continual Scientific Support in the implementation and dynamic evolution of the Ganga River Basin Management Plan



- River Ganga – c 2500 kms
- Basin: 907,000 sq. km
- Population coverage is 45% of India – c500mn
- Transboundary river
- Needs USD 100bn capital spend
- 20 year plan
- Coverage is 11 States in India
- All major climate and environment issues related to water – floods, contamination, water scarcity, water misuse, dams, draughts etc

1. Hydropower



Issues

- 5000+ MW installed / 45,000+ MW stalled capacity
- Fragmentation of River(s)

Tehri Dam
1000 MW | 52 km² surface area

2. Pollution

An aerial photograph of a wide river with murky, brownish-green water. A small, dark boat is visible in the middle of the river. The right bank is rocky and uneven, with some debris scattered along the edge. The overall scene depicts environmental pollution.

Issues

- 12,000 MLD sewage discharge
- 3,000 MLD industrial effluent discharge
- Less than 30% treated

Kanpur Tanneries -
60 MLD chromium heavy discharge

3. Irrigation

A photograph of the Upper Ganga Canal, showing a long, straight concrete channel filled with water, bordered by a low concrete wall. The canal is surrounded by lush green fields and trees under a clear blue sky.

Issues

- 90% surface water extracted by agriculture
- Additional indiscriminate ground water abstraction causes micro-climatic issues

Upper Ganga Canal

4. Aquatic Life

Issues

5 endangered species including the rare black dolphin and the Bengal tiger

Ganga Black Dolphin



5. Socio Cultural

120mn + Attendance

Kumbh Mela
Largest Festival in the World

Issues

- Deep rooted religious significance
- Beliefs that River is God Mother and as such cannot be "Unholy"

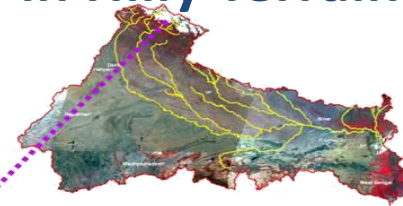
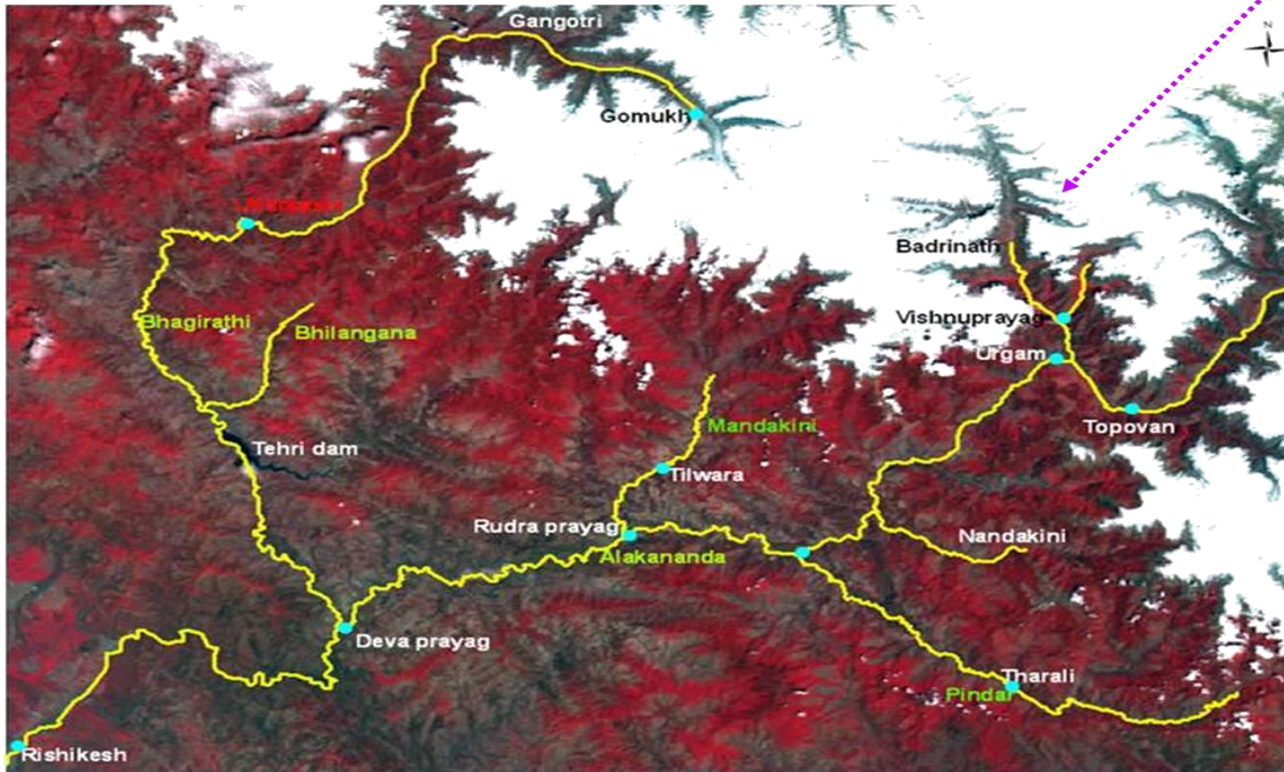
Apply modern science and adopt
innovative technologies but with
traditional wisdom

River Basin Management

- The restoration of 'wholesomeness' of all rivers of the Basin
- 'Wholesomeness':
 - "Aviral Dhara" (meaning "Continuous Flow")
 - "Nirmal Dhara" (meaning "Unpolluted Flow")
 - Geologic Entity
 - Ecological Entity
- The above objective must be achieved notwithstanding any pressures, including those arising from population growth, urbanization, industrial and agricultural activities in the River Basin

Upper Ganga Segment

294 km up to Bhimgauda Barrage, Haridwar in Hilly Terrain

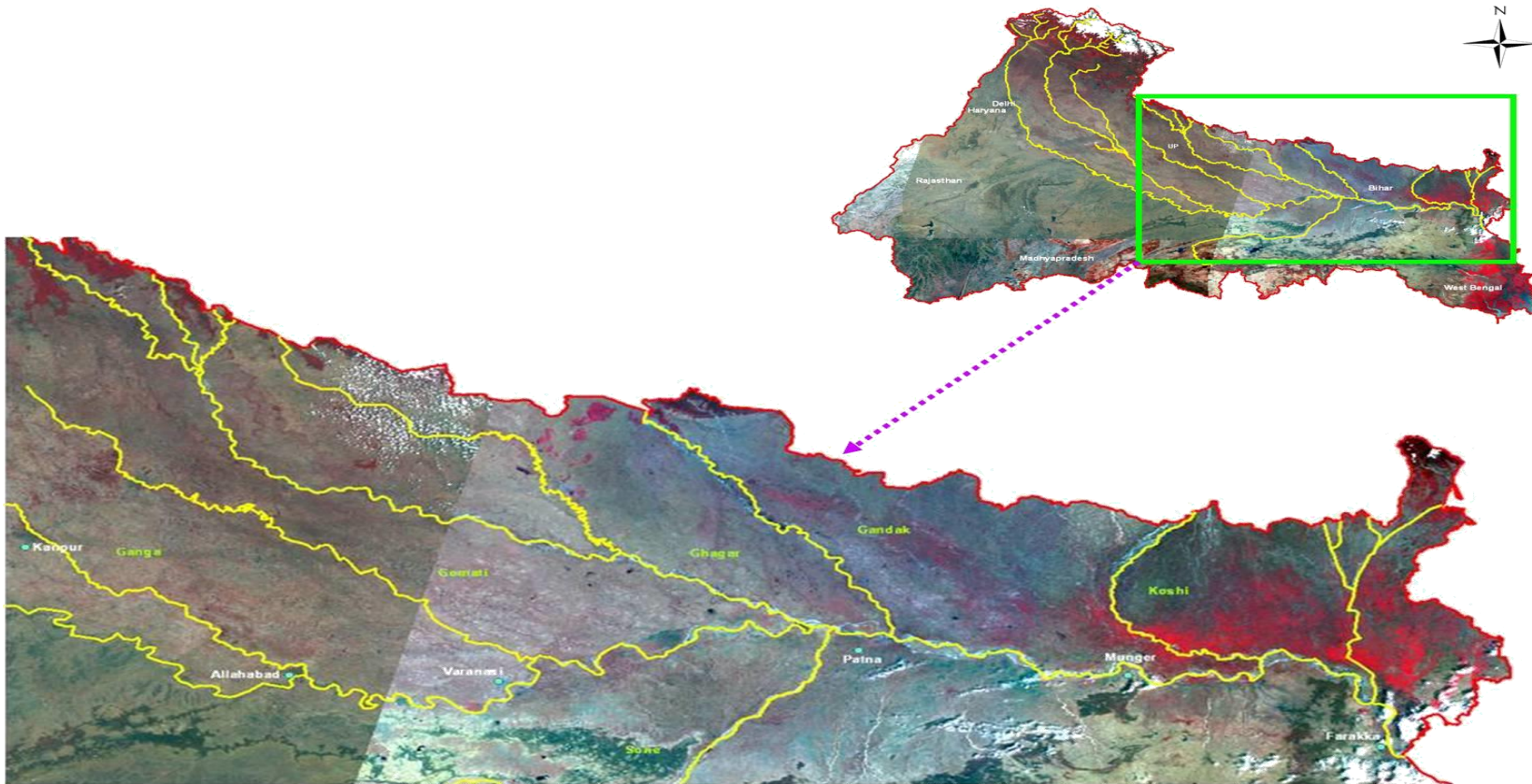


Upper Ganga

- Flows on steep and narrow bed, mostly rocks and boulders.
- Carries cold water, is subjected to much less anthropogenic pollution.
- Has highly sensitive and fragile ecosystem and biodiversity, and
- Most importantly considered to have potential for harnessing hydropower.

Middle Ganga Segment

Middle Ganga ≈ 1071 km Bhimgauda Barrage to Varanasi

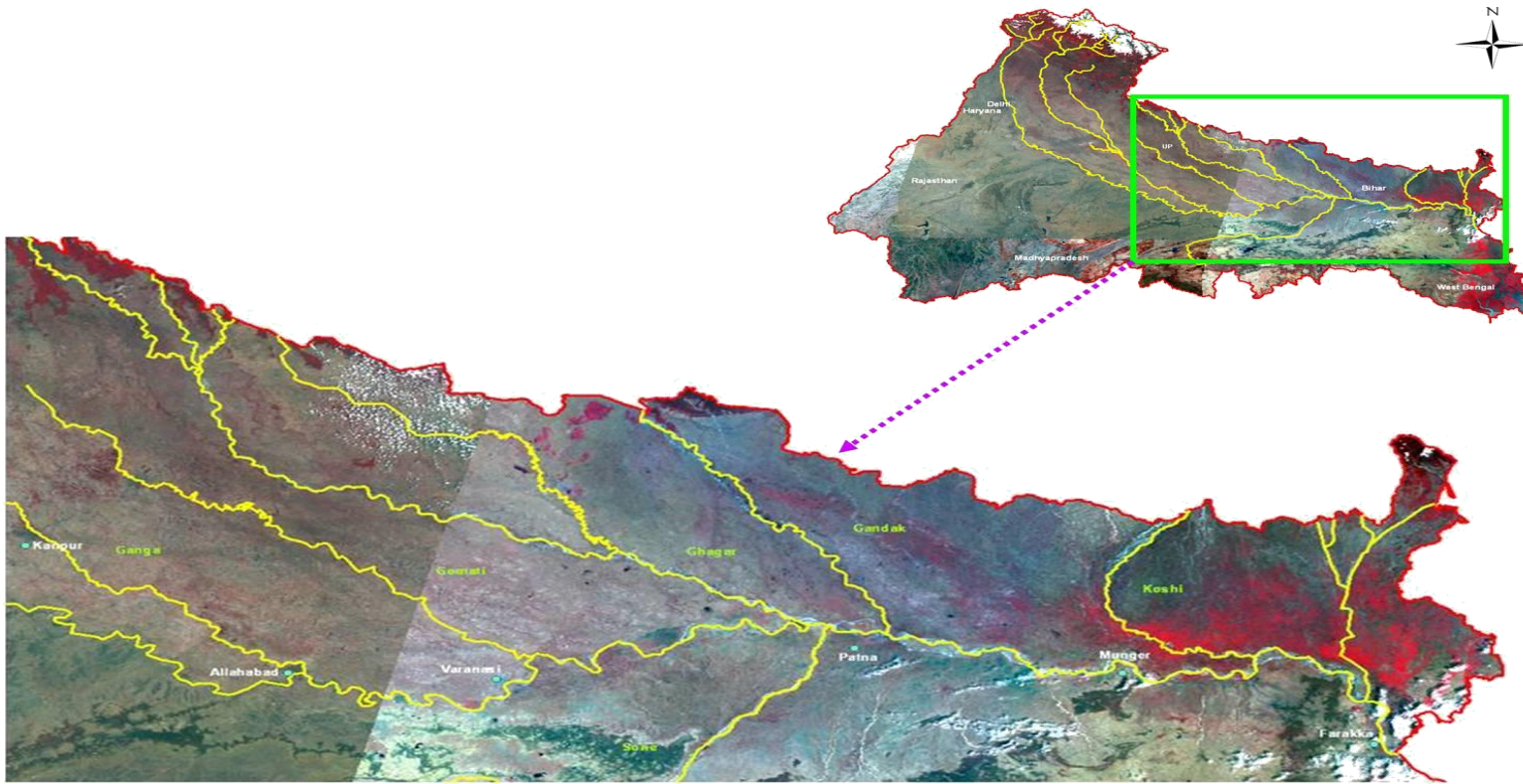


Middle Ganga

- Enters and flows in plains, meandering mostly on bed of fine sand.
- Has wide river bed and flood plain, and
- Most importantly modified through human interventions in terms of huge quantities of water diversion/abstraction and subjected to high degree of pollutant loads from domestic, industrial and agricultural activities.

Ganga Issues

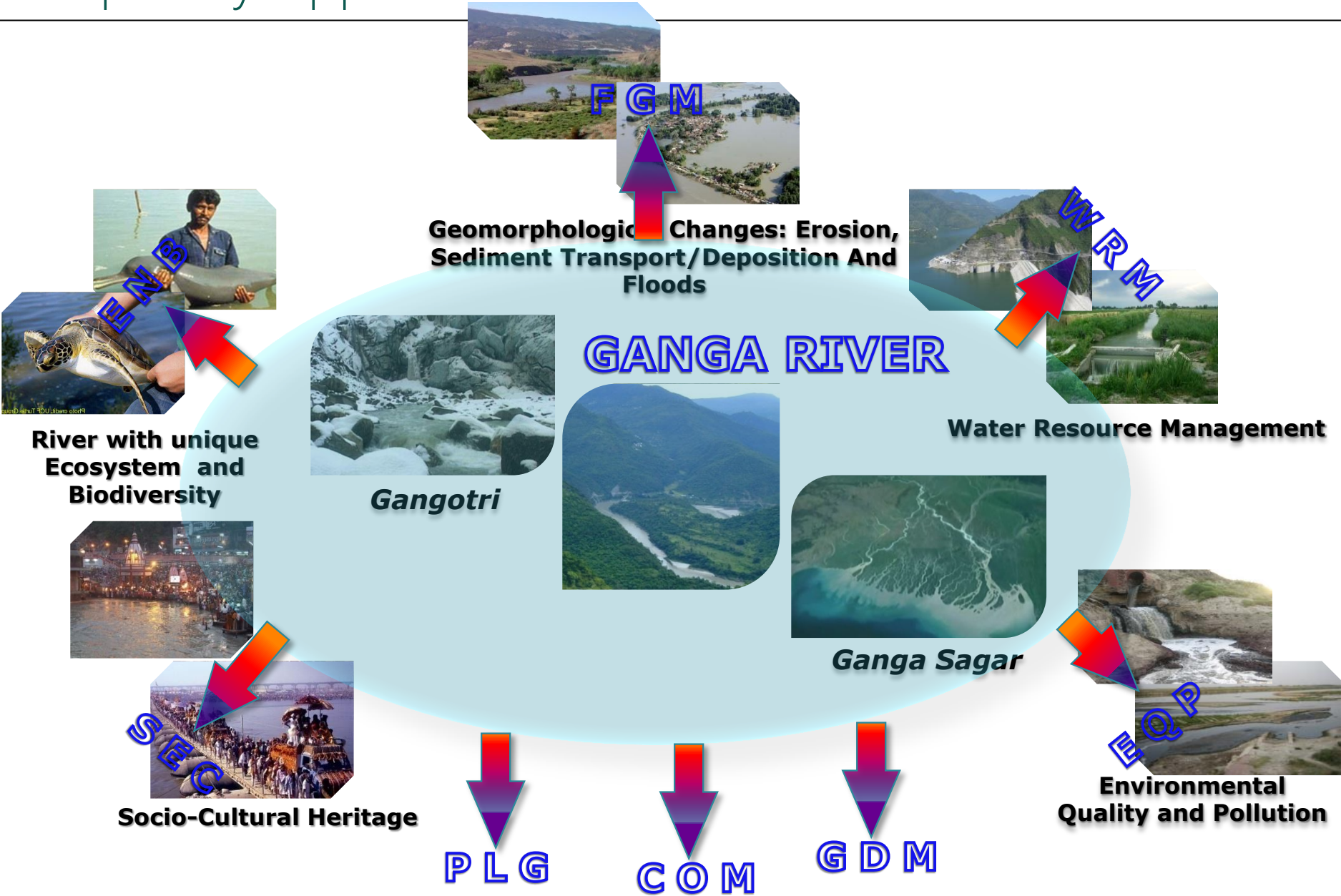
Lower Ganga ≈ 1145 km Varanasi to Ganga Sagar



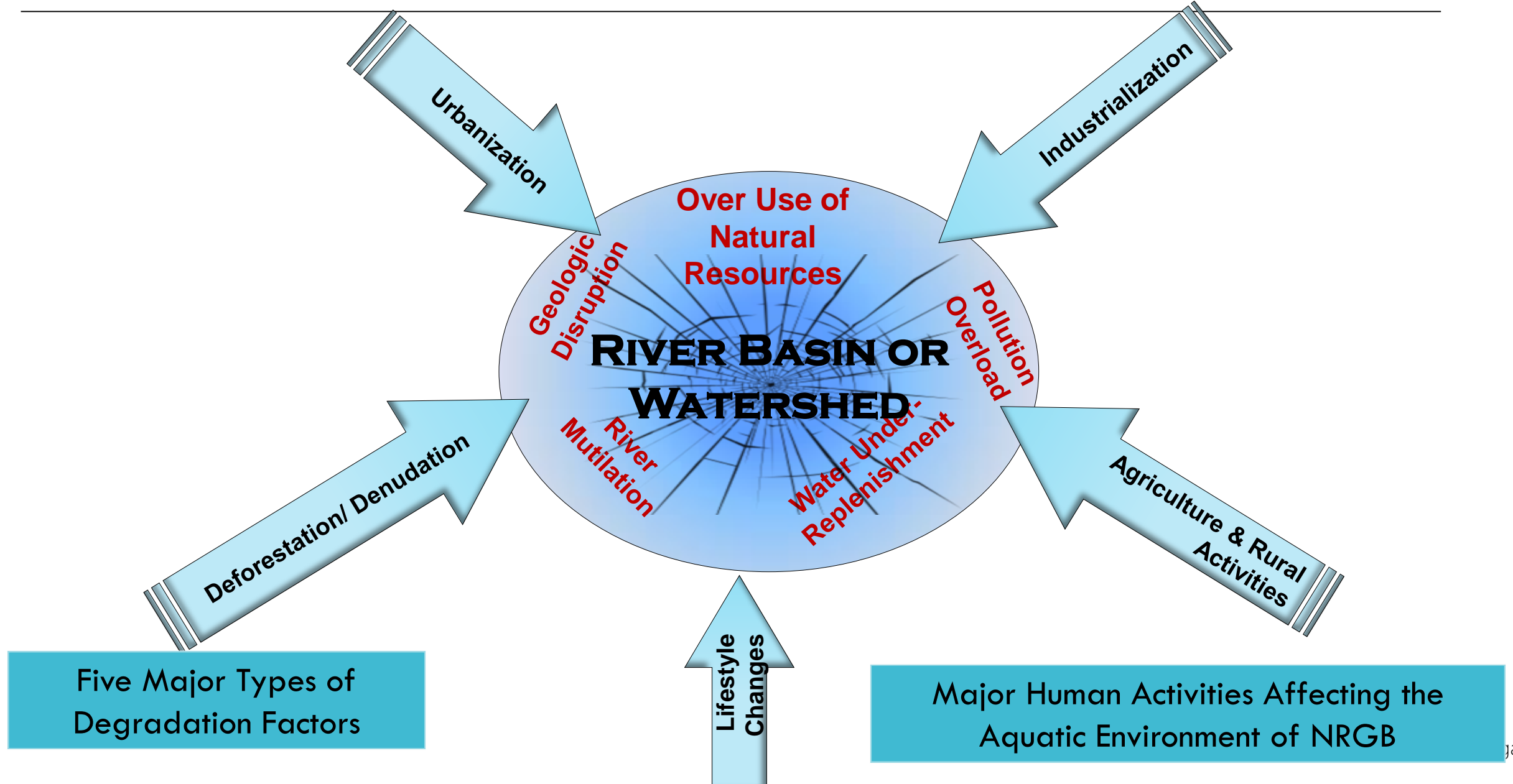
Lower Ganga

- River has experienced considerable changes in the sediment transport and deposition.
- Causes wide spread flooding.
- Undergoes frequent changes in her channel path, and
- Most importantly is subjected to international disputes on flows and interventions made and/or are being carried out/planned.

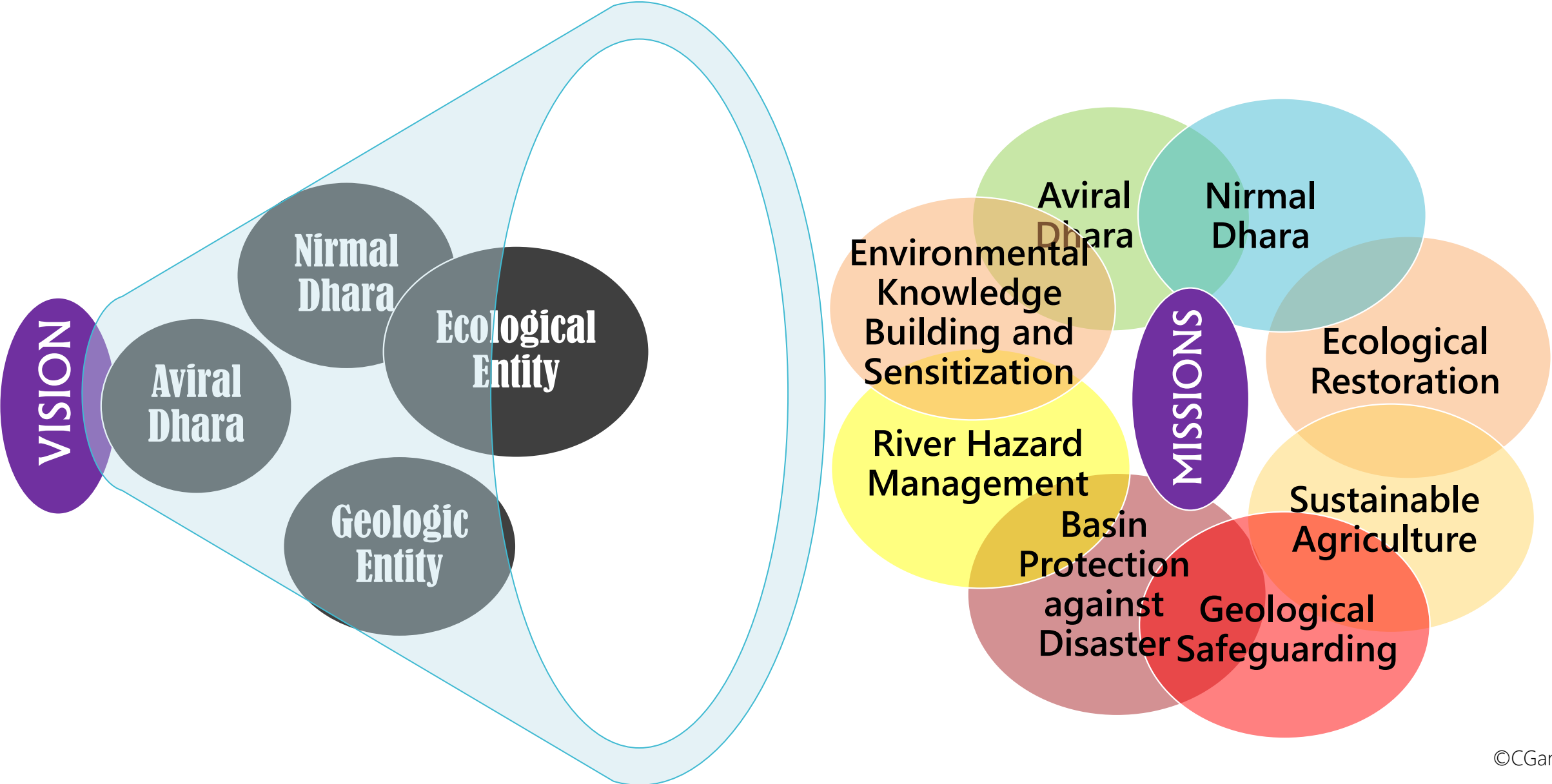
Multi-Disciplinary Approach



Issues and Concerns of the Basin



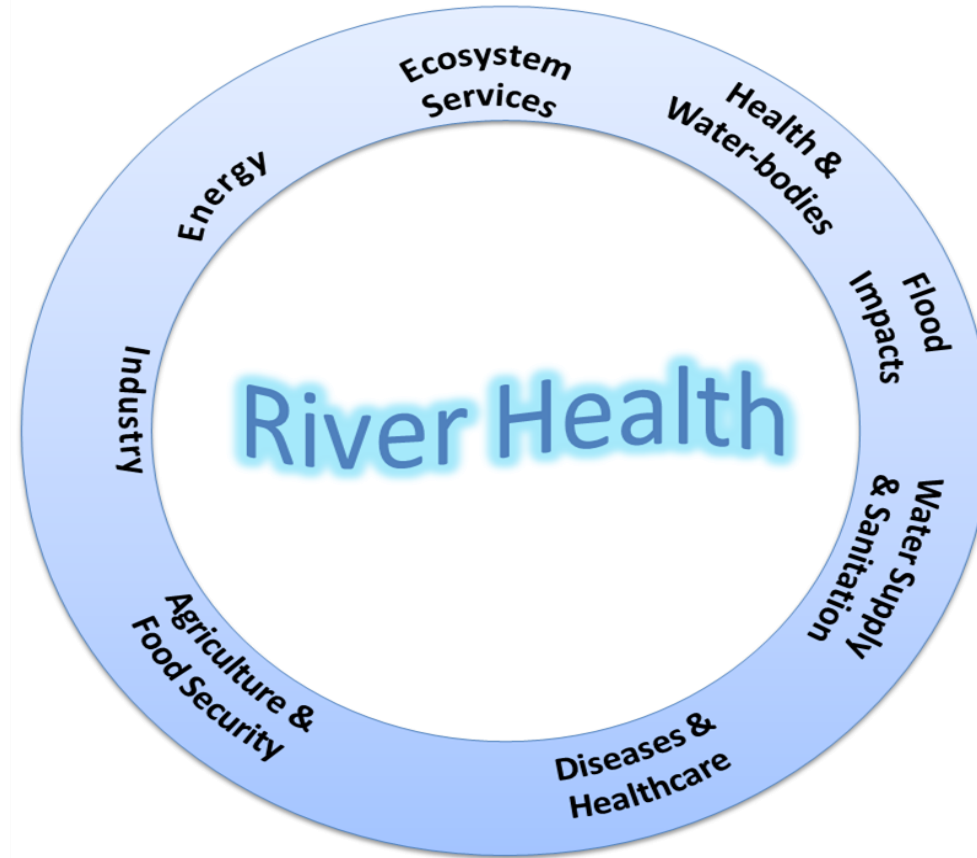
Vision and Implementation



**GRBMP is a Strategy
(Macro Level Plan)**

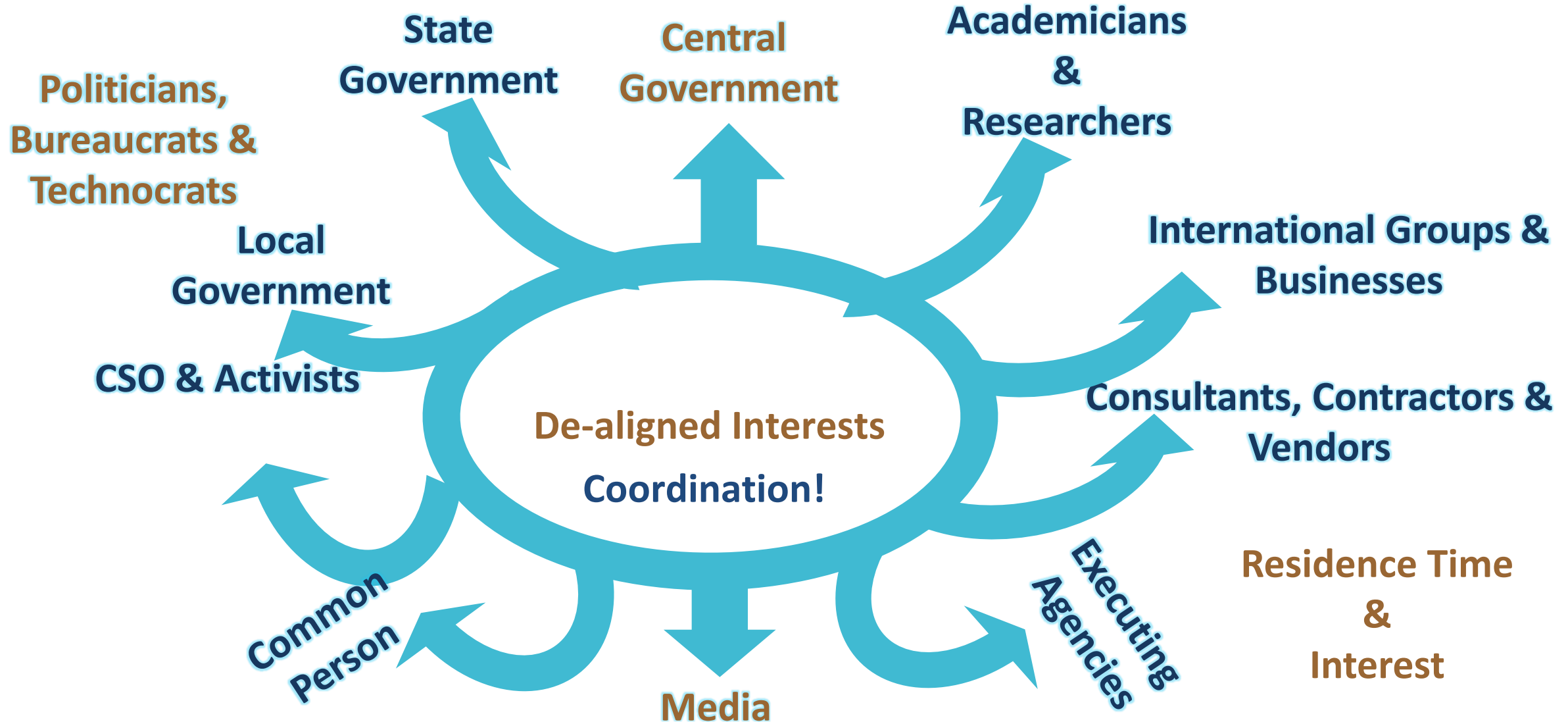
**Will need Support in Implementation
Detailing and Dynamic Evolution of
GRBMP !!!**

Implementation Challenges



Most Sensitive Sectors

Actors and their Interests



Approach

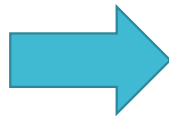


- Reactive to Proactive
- River Health as Indicator of Sustainability of Processes and Activities in the Basin
- Role of Bio-physical status
- Participation of Stakeholders
- Evidence Based

River Health

Bio-Physical Status

- Geomorphology
- Flow Health
- Hydraulics
- Water Quality
- Biota



Assessment of Goods and Services

River : river in itself provides various services, some of them are

- Bathing (spiritual/religious)
- Local livelihood
- Religious/spiritual activity in river space
- Riverbed farming

Goods : Provision of materials such as

- Water (groundwater and surface water for irrigation, industry and domestic purposes)
- Sediment (as suspended and bed load)
- Biota (fish)



Scenarios

- Pristine River
- Almost Dead River
- Business as Usual
- Alternative Scenarios

Background

Mission Statement

Transforming Ganga | Valuing Water

Established

As a Think-tank in May 2016 with an MoU signed between Indian Institute of Technology, Kanpur (IIT-K) and Ministry of Water Resources, River Development and Ganga Rejuvenation (MoWR)

Base Location

IIT-Kanpur with a Secretariat in NMCG, New Delhi

Legal Structure

Programme based at IIT Kanpur. But with a Mandate to develop CSTI and view to become a legal entity in under 10 years.

Financing

INR 100 crores (circa USD 15mn) provided as seed capital over 10 years by MoWR. To become self-sufficient in 10 years.



Prof. Indranil Manna, Director IIT, Kanpur (left) exchanging the formal MoU with Mr. Shashi Shekhar, (fmr.) Secretary MoWR, RD & GR (right) in presence of the Honourable Minister of MoWR, RD & GR, Sushri Uma Bharti (centre).

Mandate and Role of CGanga

1. Evolve Ganga River Basin Management Plan (GRBMP)

The Centre will continuously work on developing the GRBMP in a phased manner through short / medium / long term goals. It is supporting the Govt. by developing the 2017 / 2020 /2030 versions of the Plan. In doing so it will provide a permanent resource and a think-tank to the Government of India.

3. Establish a global hub for River Science, Innovation and Management.

The Centre is establishing a global knowledge hub that develops improved river monitoring protocols and devise techniques for data gathering, processing and analysis. In particular it will create specialise expertise in “River Health” and “Innovation in Water”.

2. Multi-Stakeholder Management

The Centre plays a crucial role to interact with numerous national and international stakeholders including Central and State Governments, Regulatory Authorities, Industry, Civil Society, Development Finance Agencies and Investors. The purpose of such an interaction is to develop new economic models for water management. It acts as a clearing house of knowledge and activities related to Ganga River Basin.

4. Advocacy Forum for Ganga

The Centre shall develop a multi-modal advocacy forum that shall capture views of various stakeholders and disseminate the vision, concepts, policies and framework of GRBMP. The Forum shall also publish global best practices related to water. It will organise numerous events including the flagship **India Water Impact Summit**. The Forum shall develop a framework that moves the Centre to a complete self reliance.

5 Thematic Areas

Activity Themes

(A) Science & Research

To focus on principal research and scientific themes related to Ganga and Water.

(B) Engineering and Operations

To better understand engineering and operational interventions within a River Basin

(C) Technology, Innovation and Entrepreneurship

To accelerate innovation, introduce new technologies and foster entrepreneurship through the Ganga River Basin programme.

(D) Policy, Law and Governance

To develop new models of water governance, create the right regulatory and policy frameworks.

(E) Finance and Investments

To develop market instruments and attract private sector investments through innovative financing models.

12 Priority Areas Defined

Decentralised Wastewater Treatment

Developing small, compact and energy efficient solutions that can be deployed upon numerous drains to improve the quality of water flowing into the river.

Centralised Wastewater Treatment

Implementing solutions that are fit-for-purpose and energy efficient considering the large requirement within the Ganga River Basin. Appropriate solutions are needed not just for new-builds but to also retrofit existing plants.

Industrial Effluents Treatment

Zero liquid discharge solutions for the most prevalent industrial effluent streams within the Ganga River Basin including tanneries, textiles, pulp & paper, distillery and chemicals & pharmaceuticals.

River Basin Mapping and Modelling

Developing high resolution maps and models for Hydrology, Ecology, Geomorphology, Demography, Socio-Economic and other pertinent areas. The modelling shall lead to the development of an advanced Eco-system services model.

Hydro-Metro-Ecological Measurements

Including Sub-surface water hydrology and Aquifer mapping

Urban River Management Planning

To develop hydrological masterplans for rivers passing through urban areas.

Remote Sensing

To develop remote sensing techniques using satellite imaging, advanced imaging cameras mounted on low-altitude UAVs/drones, in-situ sensors and hand-held devices.

Advanced Sensor Development

To develop low power/low-cost sensors for data collection

Big Data and Deep Learning

To establish a real-time big data and analytics platform with cognitive and deep learning techniques. Development of APIs and data sharing protocols for a wide range of stakeholders to tap into the big data platforms.

Rural Community based models

To develop innovative rural community based solutions that bring better sustainability and water management best practices including those in agriculture.

Innovative Financing Models

To develop a range of financial instruments for long term financing of water related infrastructure.

Water Rights and Governance Models

To establish best practices around governance of water in the context of large River basins.

International Chapters

International Chapters

Collates global expertise and channels interests to priority areas

Multi-Disciplinary Approach

Science, Innovation, Skills, Finance, Governance, Operations

Multi-Stakeholder Collaboration

Individuals, Institutions, Industry, Investors, Civil Society and Professional Services

Global Collaboration

Not just bi-laterals but multi-country partnerships

Global Advisory Pool

Each chapter has established (or will) a committee made up of experts who shall contribute in developing best practices, innovative framework and be available as a sounding board to NMCG, CGanga and other stakeholders

Chapter 1: UK



Key Focus Areas:

- > Governance – PPP, Water Rights
- > Finance – Project Finance, Trading Platforms, Bonds
- > Modelling
- > Technology and Business Model innovation
- > Hosted by a group of institutions and individuals

Chapter 2: EU



Key Focus Areas:

- > Multi-Country Collaboration
- > Technology Transfer
- > Hosted by VITO (Brussels)
- * Launches in October 2017

Other Chapters



Under Development

- > North America
- > Gulf
- > Asia 1 & 2
- > Australasia
- > Latin America
- > Africa



Case Study

Project Example

Advanced Information and Knowledge Platform

A. Data Sources



Satellite



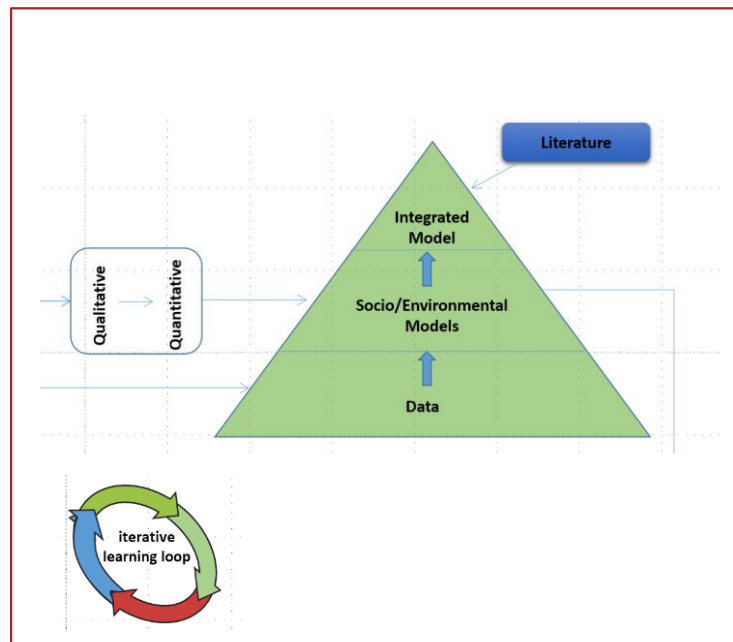
Drones

In-situ sensors

Handheld Sensors and devices



B. Data Storage & Modelling



Lead Organisation and Partners



C. Analytics

Hydro power

Potential of hydropower generation, sites, conflicts, trade-offs

Agri & Water

Irrigation demand/supply, tracking over-extraction

Water Supply

Core water supply systems / management and rights

Flood Warning

Flood/Landslides/Disaster Management and Warning Systems

Simulations
 S_1, S_2, \dots, S_n

MAP SHOWING FLOOD PROTECTION WORKS AND CANALS IN UTTAR PRADESH

LEGEND

- DAM
- BARRAGE
- CANAL
- RAILWAY
- ROAD
- STATE BOUNDARY
- INTERNATIONAL BOUNDARY

TABLE

S.NO.	NAME OF DAM/BARRAGE	DISTRICT	TYPE
1	Asi Sagar	Aligarh	Dam
2	Bara	Bara	Dam
3	Bhakra Nangal	Bhakra	Dam
4	Bhakra Nangal	Bhakra	Dam
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1. Consortium Approach

2. Targeting on New Zealand's strengths such as

- Biological / Natural Treatment Systems
- Water based tourism and recreational economy
- Community engagement
- Others -

Proposed Projects and Approach

1. Treatment Systems

- Team New Zealand to propose a range of technologies, solutions and approaches for treatment systems
- CGanga shall identify and secure one or more project sites exclusive for Team New Zealand
- All licenses and permissions shall be secured
- Technology Transfer and Partnerships

2. Data and Information Gathering

- Data Generation – Remote Sensing, Drones, Sensors
- Integration into Decision Support Systems
- Analytics

3. Community Engagement

- Propose twinning with Waikato River
- Establish a community engagement programme
- Policy, regulatory and governance framework

4. Other innovations in the water sector

Multi-Disciplinary Approach

- Science & Research
- Engineering
- Technology & Innovation
- Skills and Training
- Regulatory
- Social Enterprise
- Finance & Investments
- Legal
- Insurance
- Media
- Civil Society and Soft Diplomacy

India Water Impact Summit

1. Major event focused on water sector in India with a strong focus on implementation and not just creating a dialogue.
2. Date and Theme:
 - 4 – 7 December 2017
 - Location: New Delhi
 - Theme: International Cooperation for Ganga - as a centre theme
3. Format
 - Opening and Closing Plenary sessions on 4th and 6th December
 - Few high level sessions
 - Most sessions will be working group and roundtable meetings to ideate and discuss progress
 - Highly Exclusive Event – By invitation only
4. International Participation
 - Minister led delegations
 - 15 country participation
 - Over 150 international delegates

Thank you

