



Joint development of a methodology to assess E-Flows in India under the India-EU Water Partnership: Pilot testing results in Ramganga Sub-Basin



E-Flows Workshop | 21-22 October, 2019 | The Claridges, New Delhi



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IEWP – ACTION PLAN & 9 PRIORITY AREAS



1 Sustainable River Basin Management

2 Environmental Flows

3 Ganga Rejuvenation

4 Groundwater Use

5 Water Use in Irrigation

6 Solar Pumping for Irrigation in RBMPs

7 Capacity Building

8 Treated wastewater reuse

9 Research, Innovation, Technology

www.iewp.eu

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Objectives of the Joint Initiative

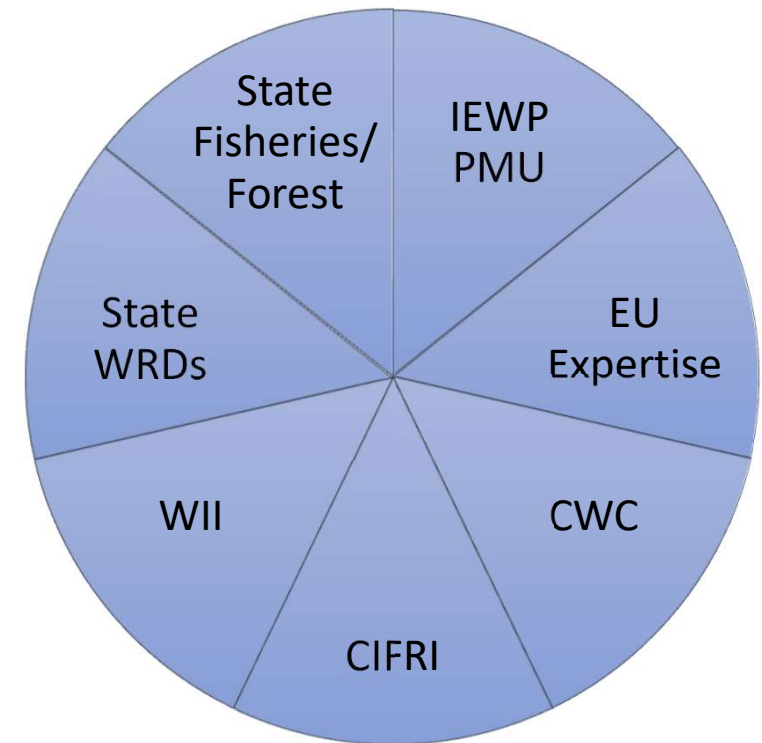


- Development of the **Data Framework for E-flows Assessments**
- Development of the **Guidance Document** for pilot E-flow assessment.
 - European experiences and lessons learnt
 - Case-studies and success stories from EU and international indicatives
 - Comparative evaluation of E-flows assessment methodologies
 - Standardise the methodology(ies) for assessment for 3 different hydro-climatic regions

The guidance document will be finalised after the assessments in three pilots and lessons from this workshop

Objectives of the Joint Initiative

- Evolve a mechanism for assessing the **socio-economic benefits/impacts of E-flows** and river ecoservices.
- Recommendation of a **Strategy for implementing** E-flows including pilot implementation and monitoring of e-flows.



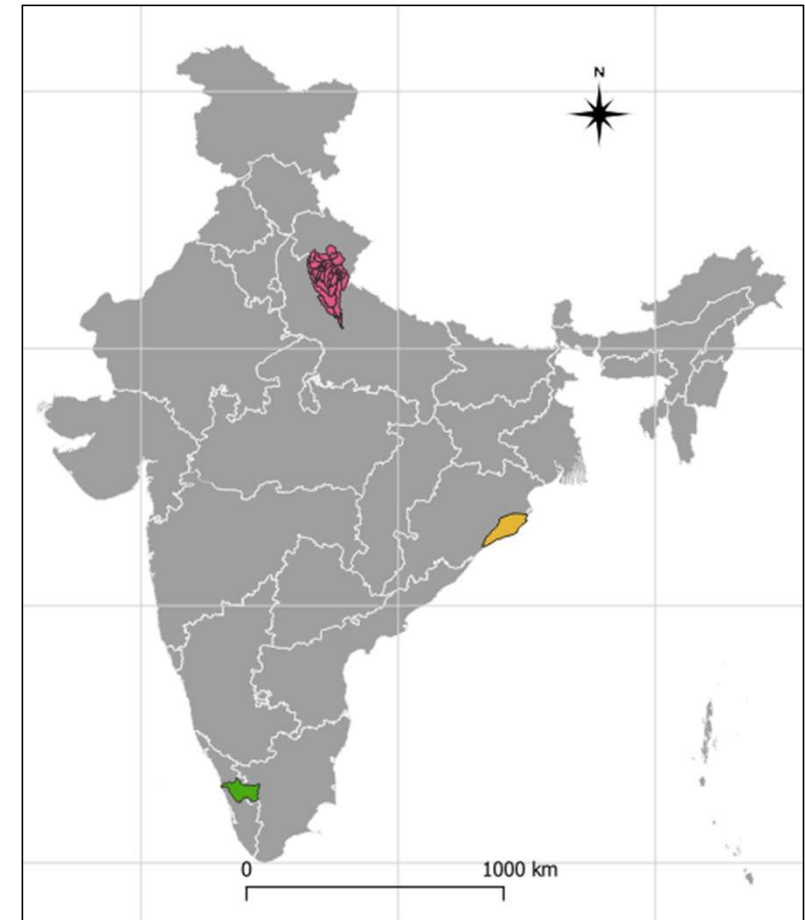
Designated Pilots

Diverse hydro-climatic regions of India

- Ramganga River Basin: Sub-Himalayan system
- Mahanadi Delta : Estuarine eco-sensitive hotspot
- Bharathapuzha River Basin: Westward flowing River

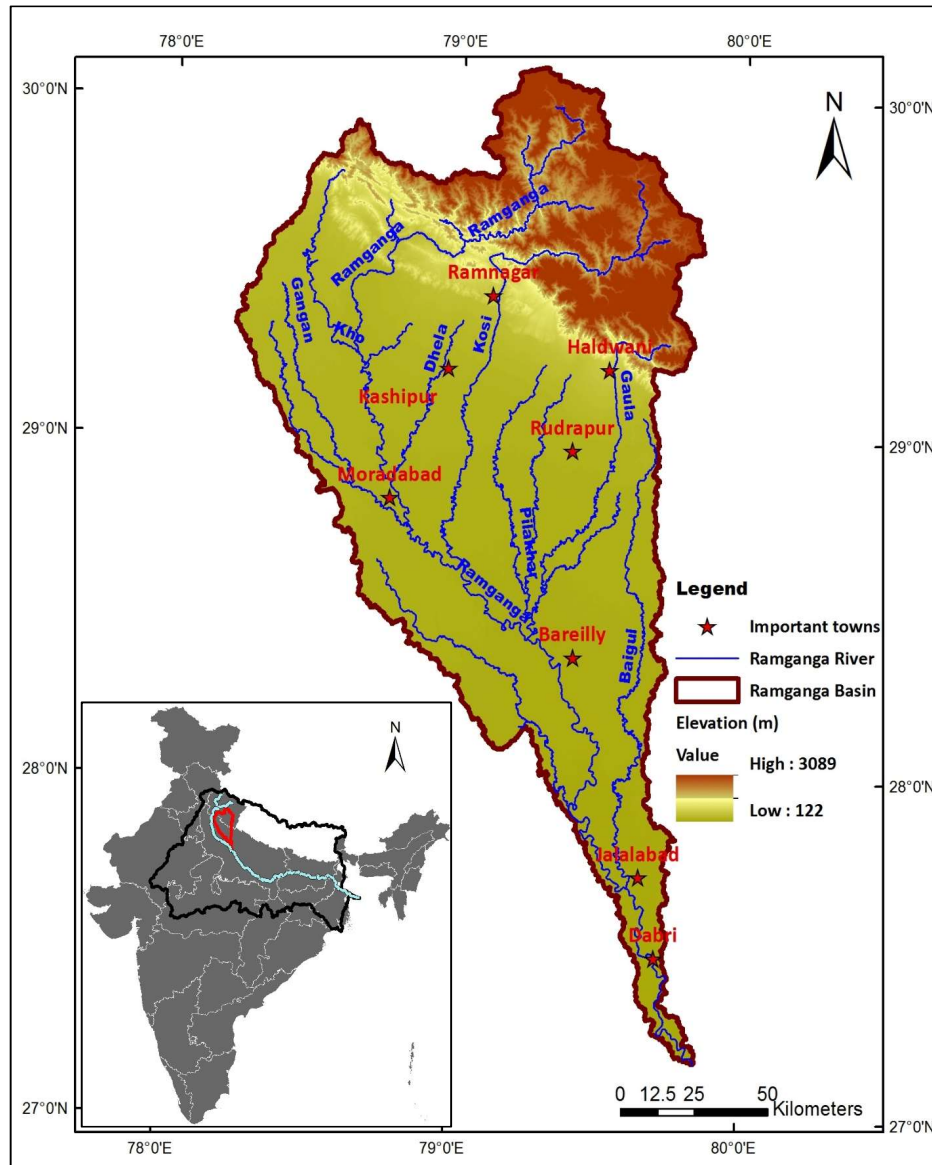
The Basis of Selection -**heterogeneity** in terms of

- ◉ Hydro-meteorological
- ◉ Ecological domains etc.





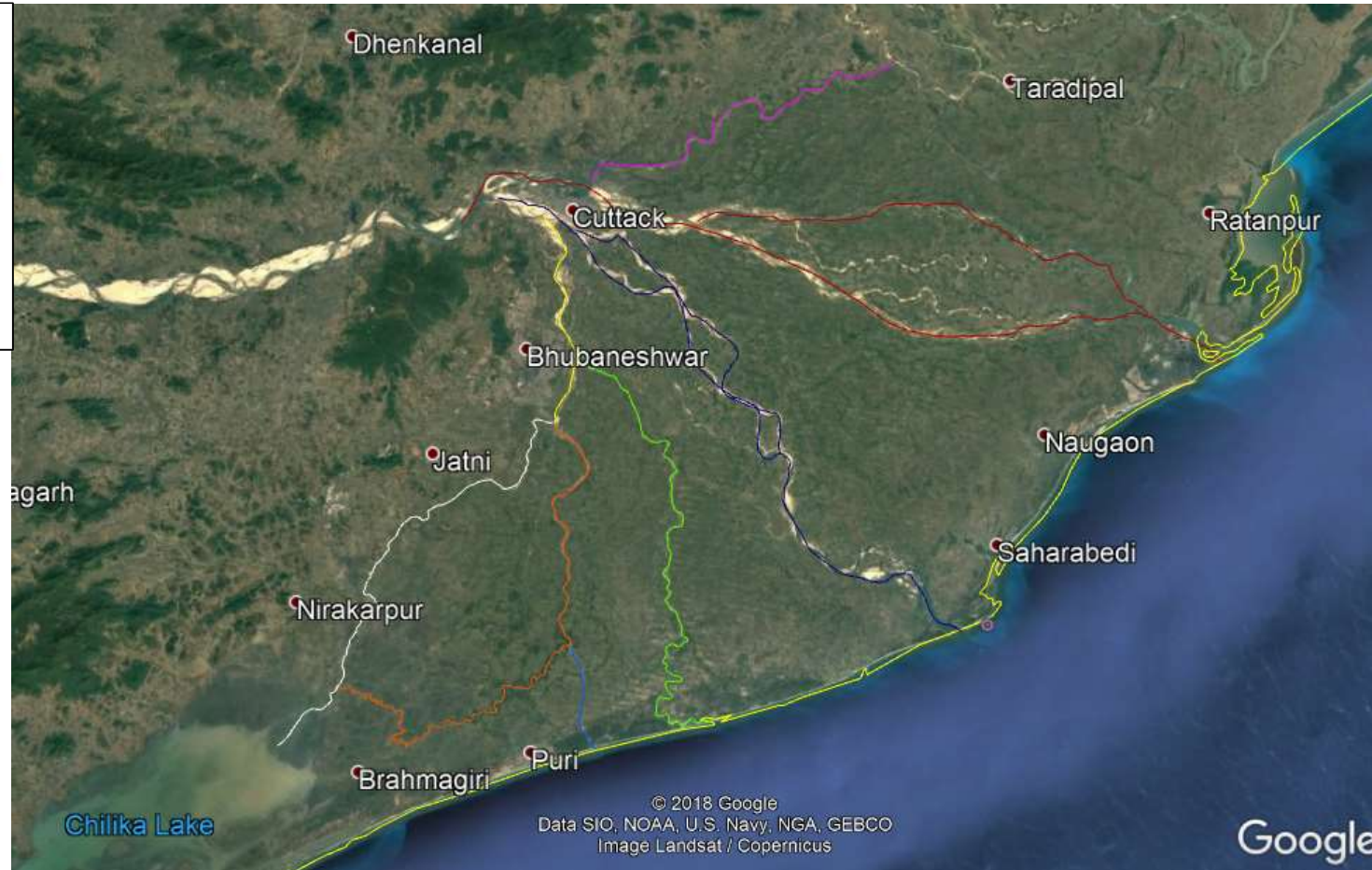
Ramganga River Basin



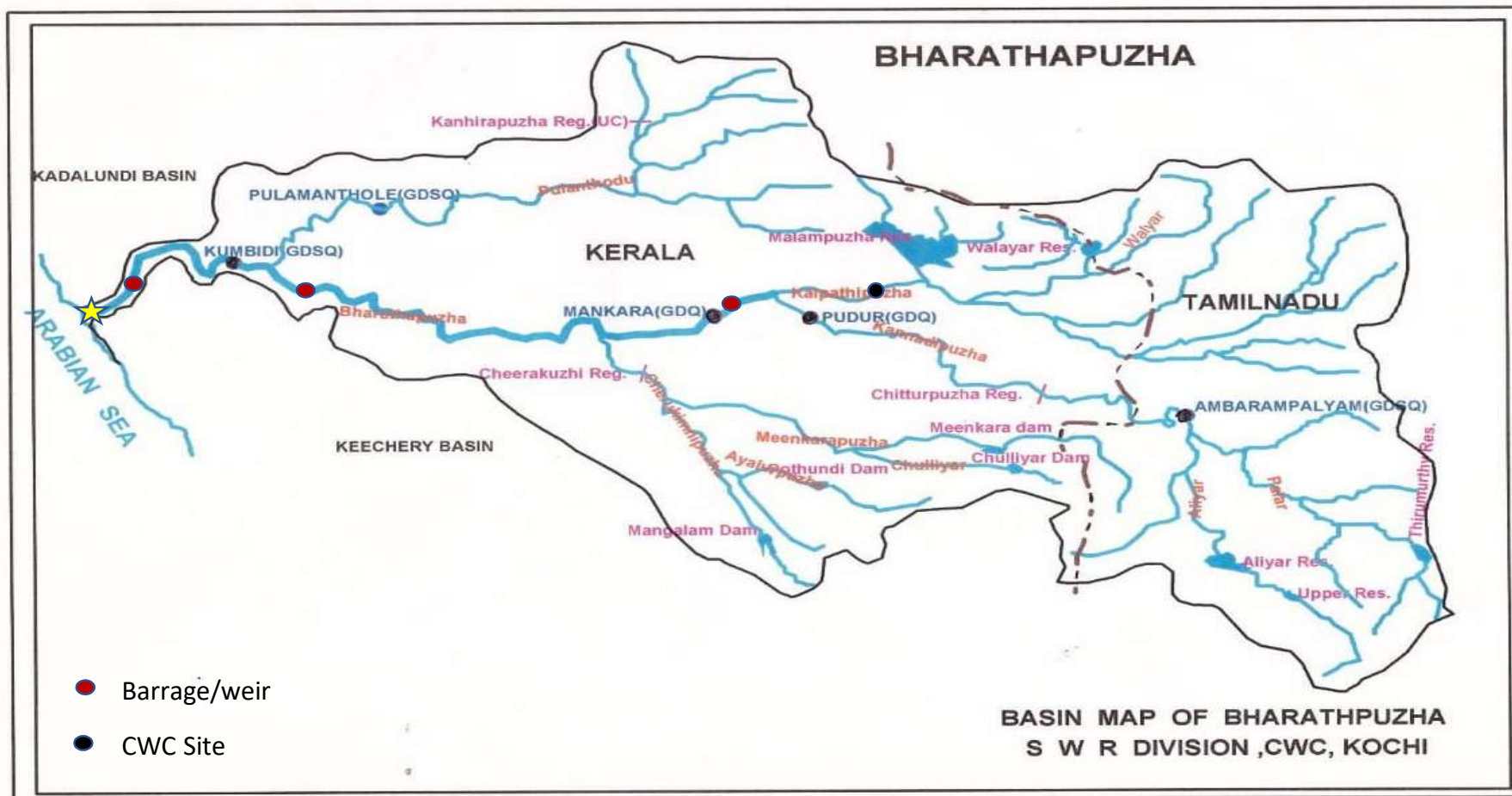
Mahanadi Delta



- ☒ Daya River
- ☒ Bhargavi River
- ☒ Nuana River
- ☒ Kushabhadra River
- ☒ Kathajodi River
- ☒ Kuakhai River
- ☒ Birupa River
- ☒ Mahanadi River



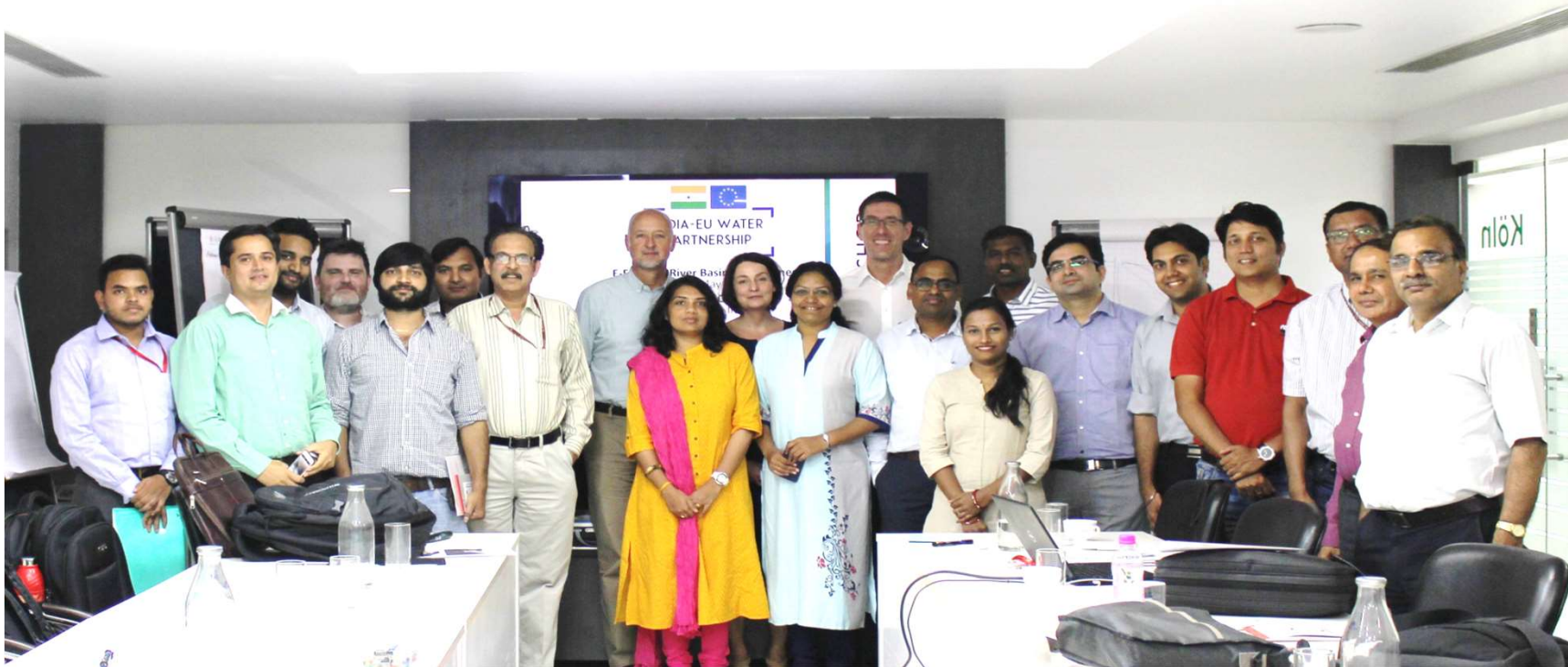
Bharathapuzha River Basin



Joint efforts undertaken so far



- Joint Workshop during 21-22 May 2018 followed by field visits to deliberate on most appropriate methodologies.

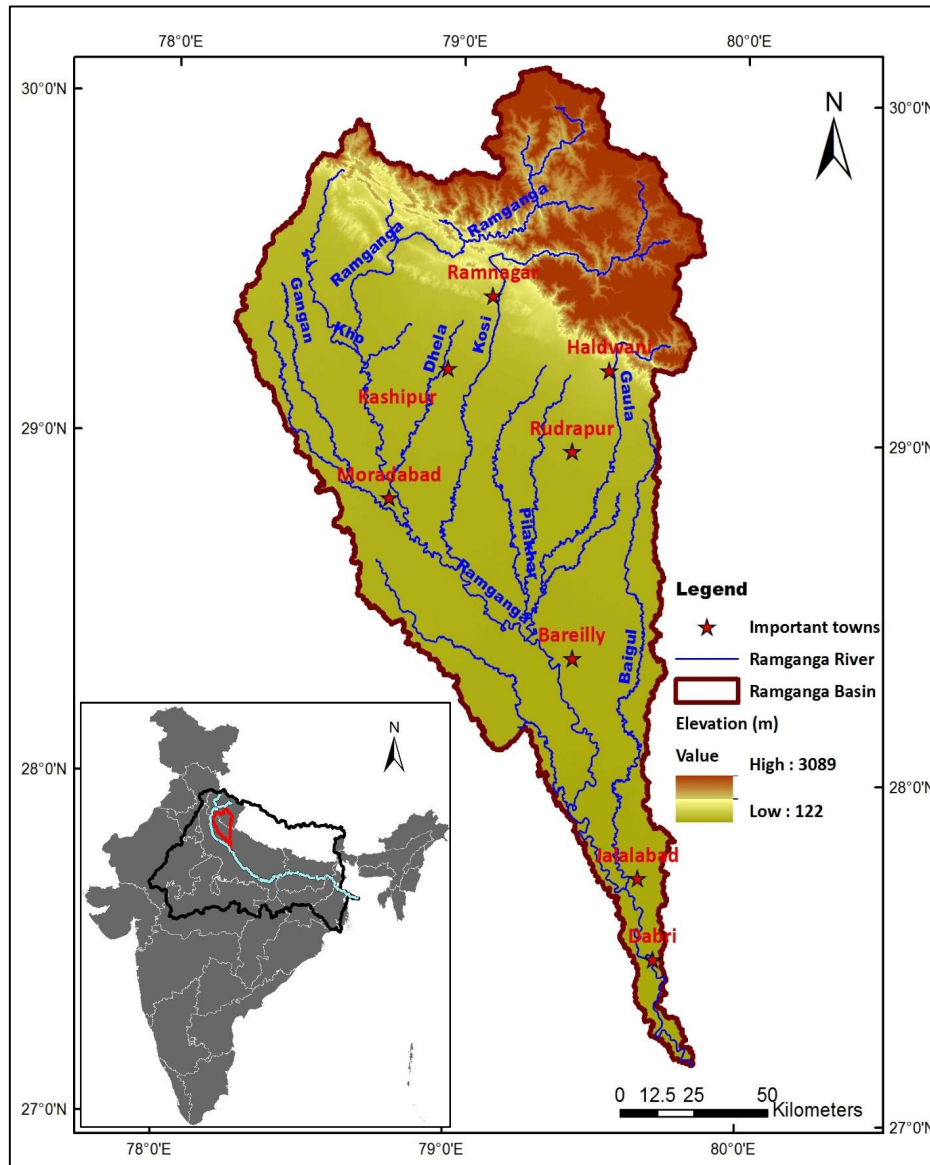


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Ramganga Field Visit

Locations visited

- Important Towns
- Abstraction/diversion structures
- Eco-sensitive zones



Ramganga Field Visit

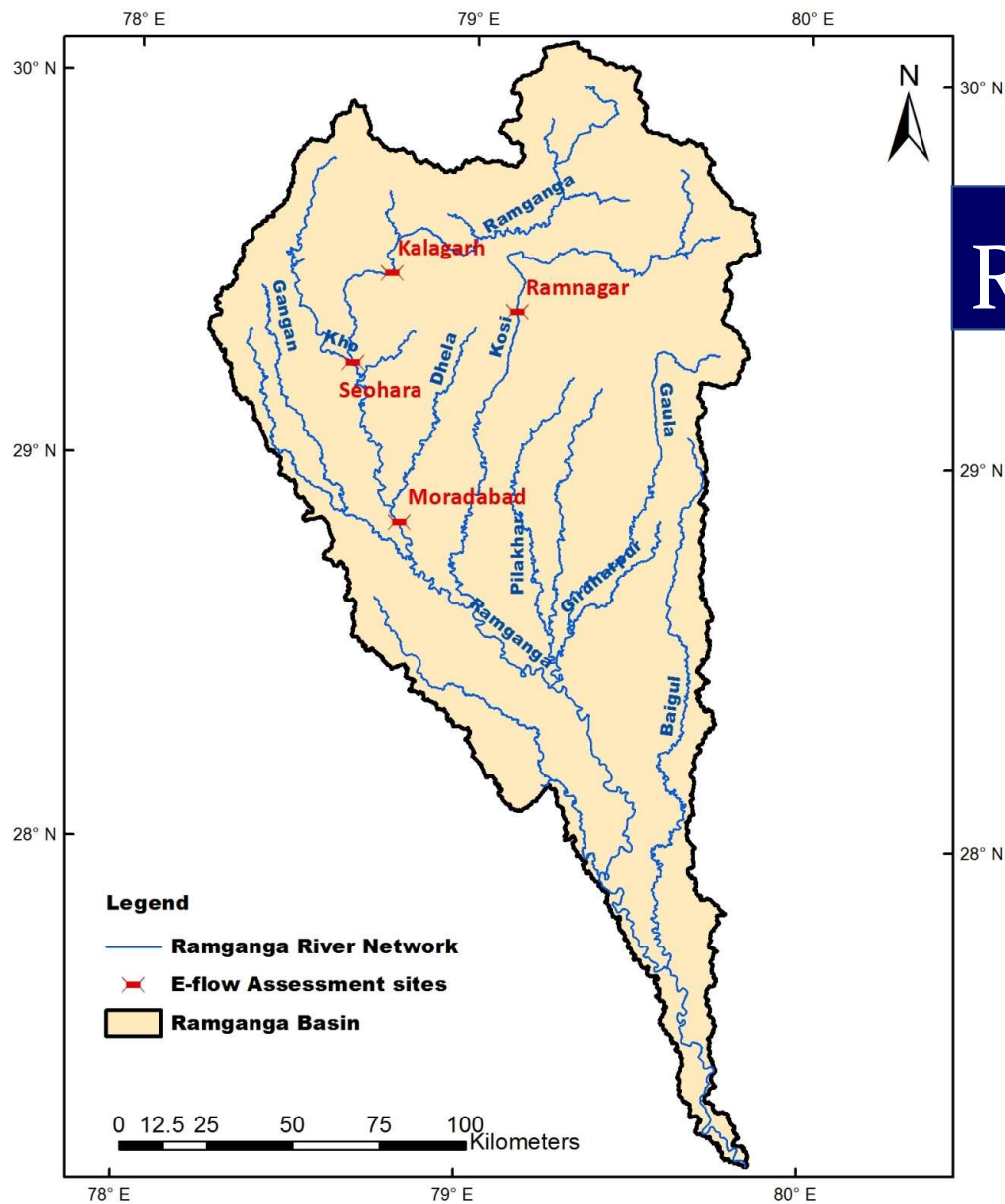


- **Ramganga Basin:** Field visit during 23-25 May 2018 to identify the critical reaches.



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Ramganga – Critical Sites

1. Below Kalagarh Dam- (on Ramganga River)
2. Below the confluence of Ramganga and Kho- (Seohara on Ramganga River)
3. Moradabad (on Ramganga River)
4. Below Ramnagar Barrage (on Kosi River)



Data Collection

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Ramganga Data Collection

Cross section surveys during October 2018



Every 5 m laterally- and 1km reach in total length

Ramganga Ecological Data

Fishermen/locals Consulted

Species noted- Soli, Lachi, Chaal, Singhara, Muraki, Kalabans and Golden Mahseer



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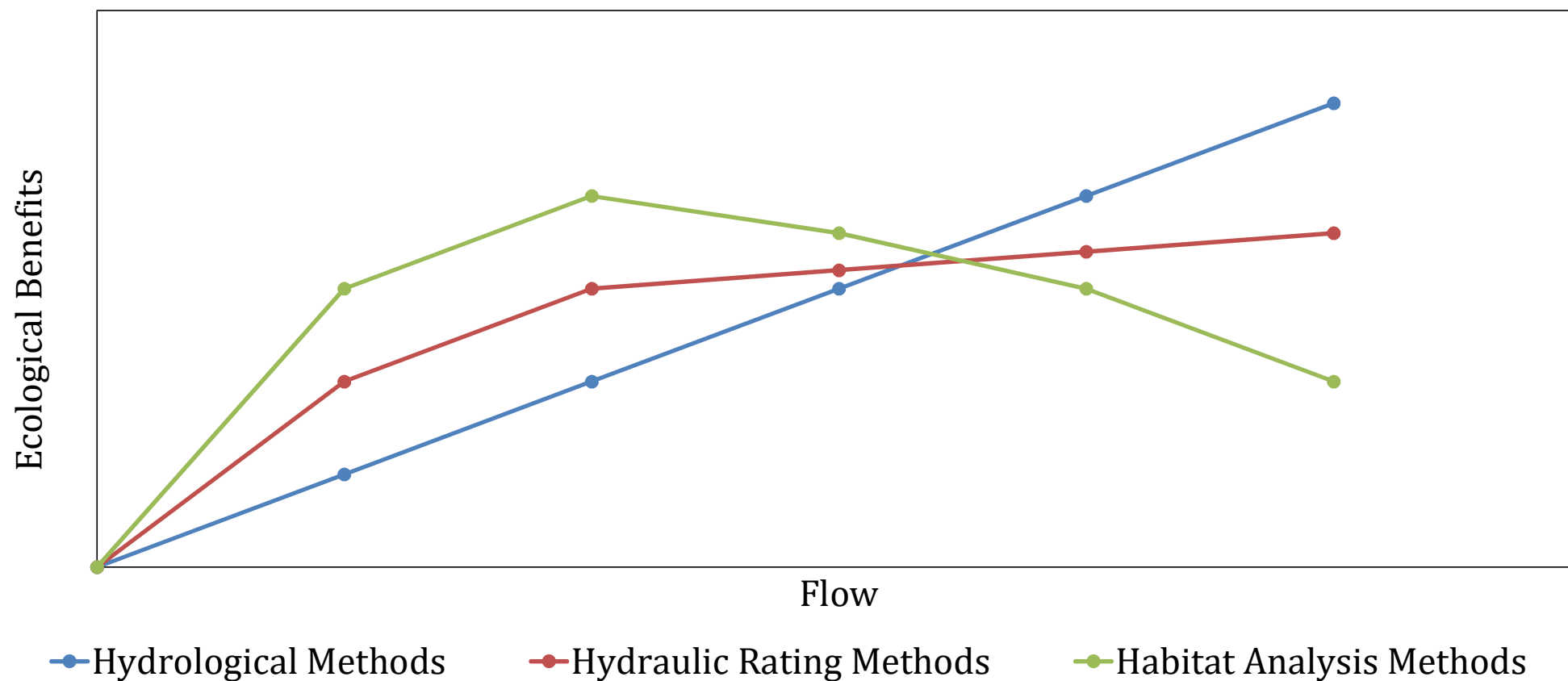


E-Flows Assessment Methodology

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E-Flows Assessment methods



Jowett, 1997



Hierarchical Step-By-Step Methodology

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Hydrological Analysis

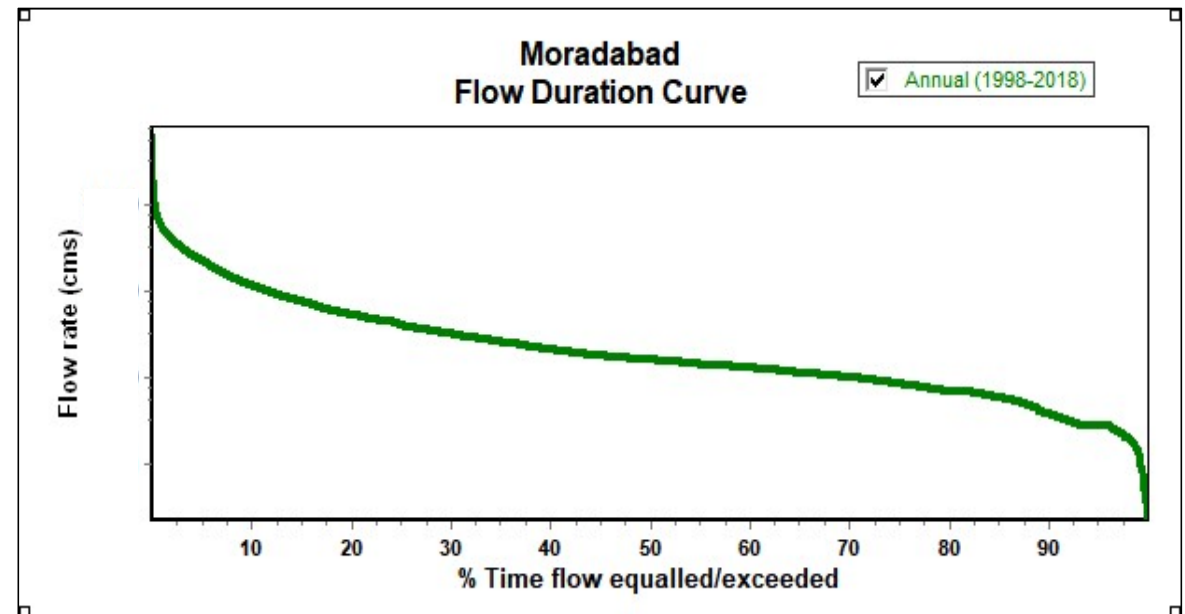


Approaches-

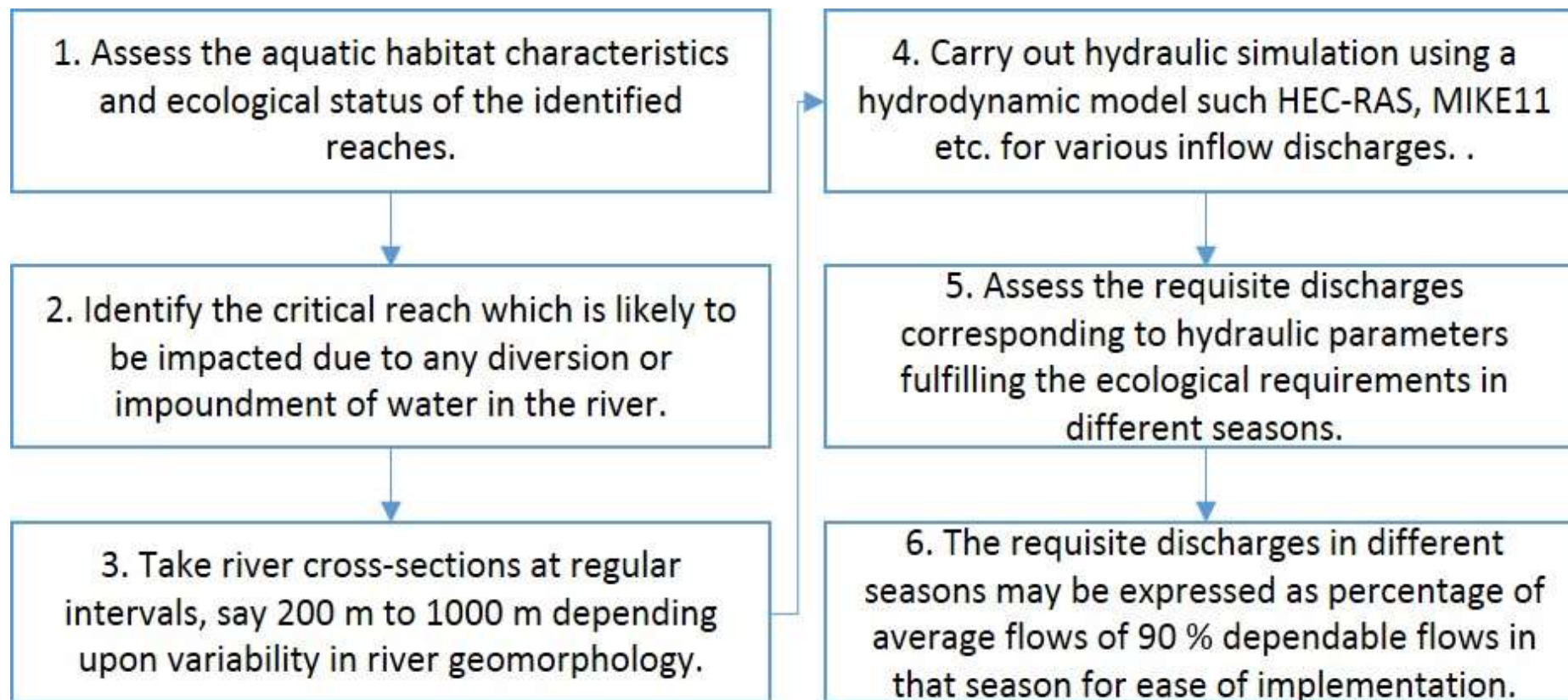
- ⦿ Percentages of flows (e.g. 10% of flow)
- ⦿ Hydrological Alteration limits-IHA

Understanding hydrological regime

- ⦿ Baseline/reference scenarios
- ⦿ Present Scenario
- ⦿ Vision/objectives of E-flows



CWC Approach



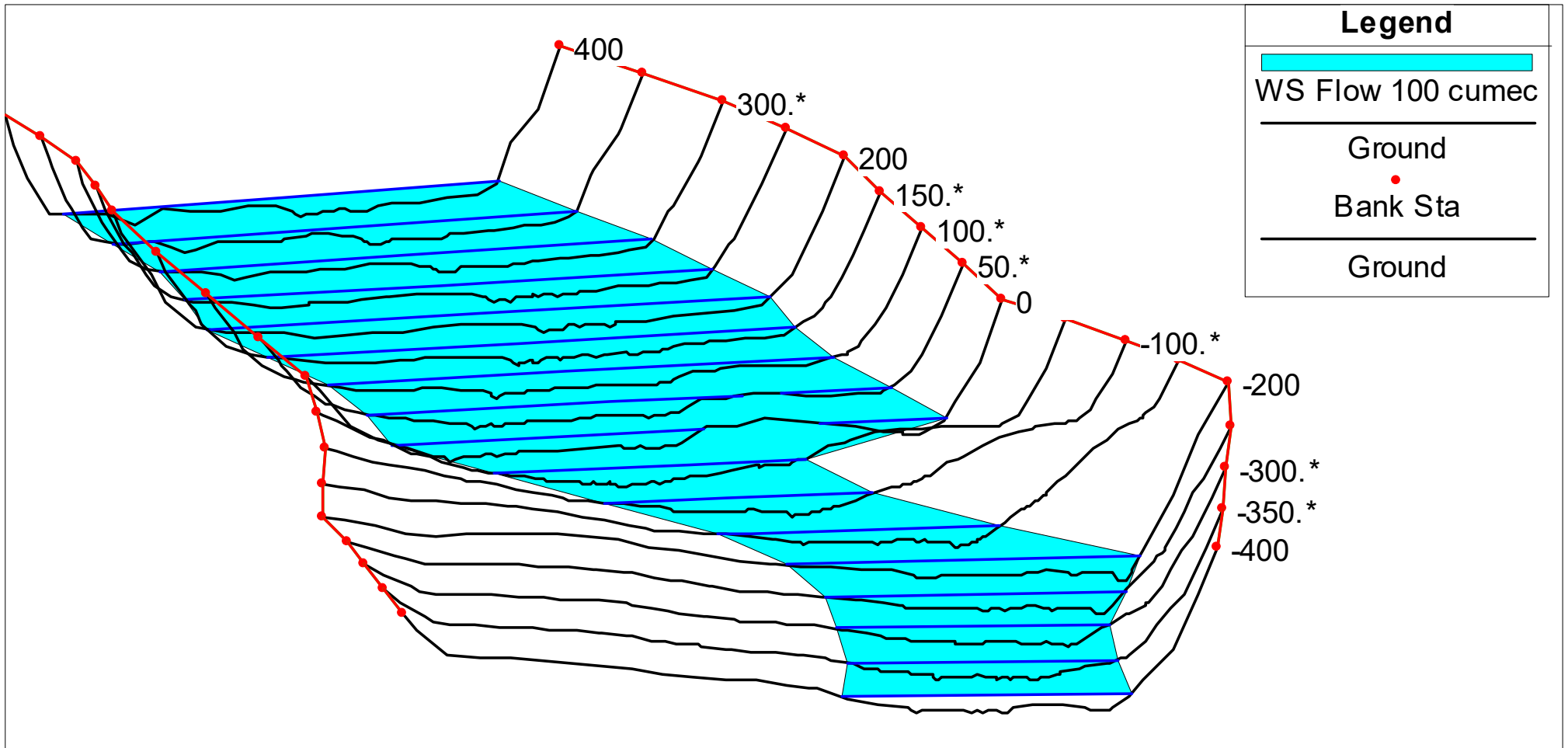
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Hydraulic Analysis-Kalagarh



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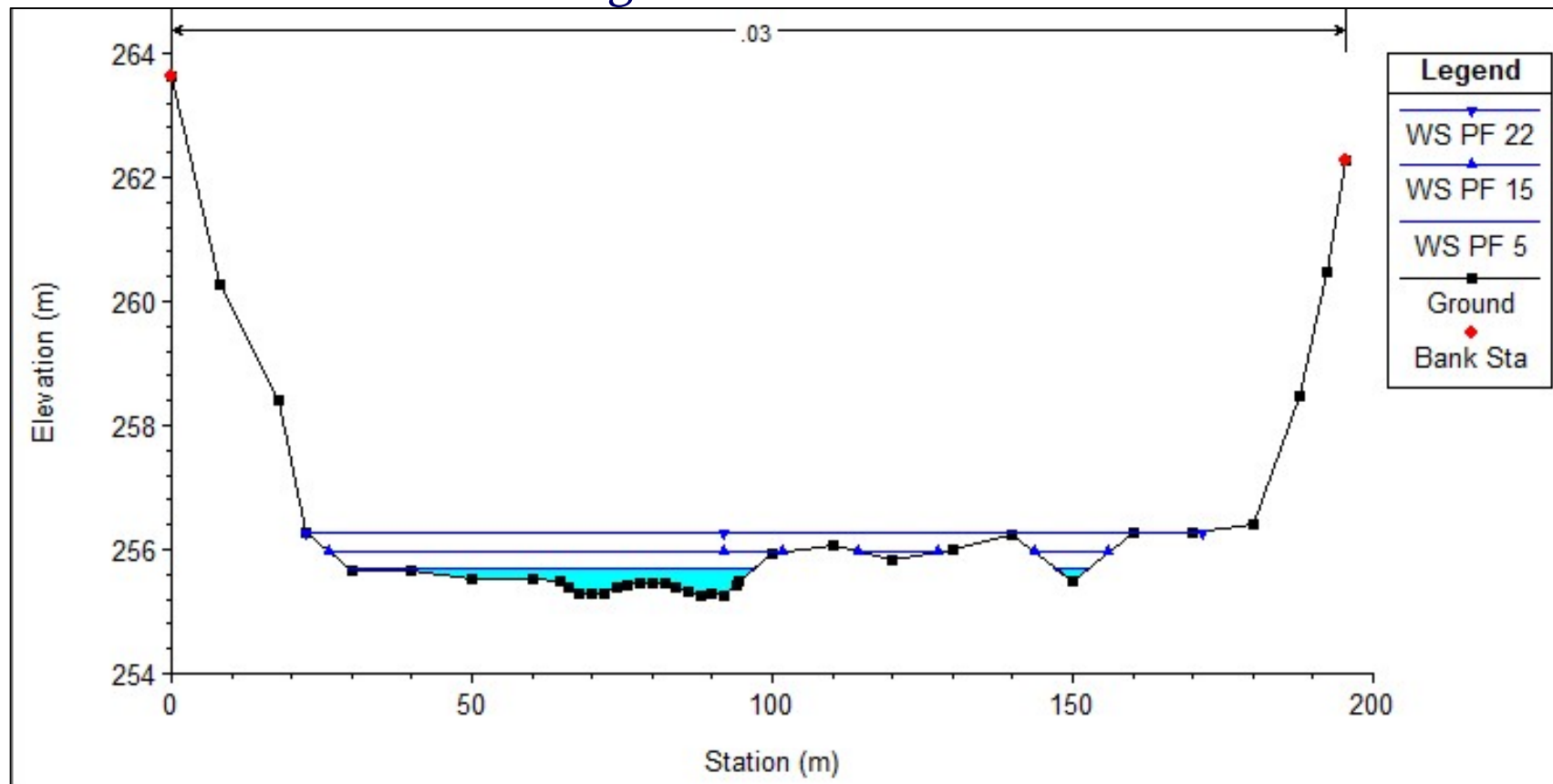
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Hydraulic Analysis



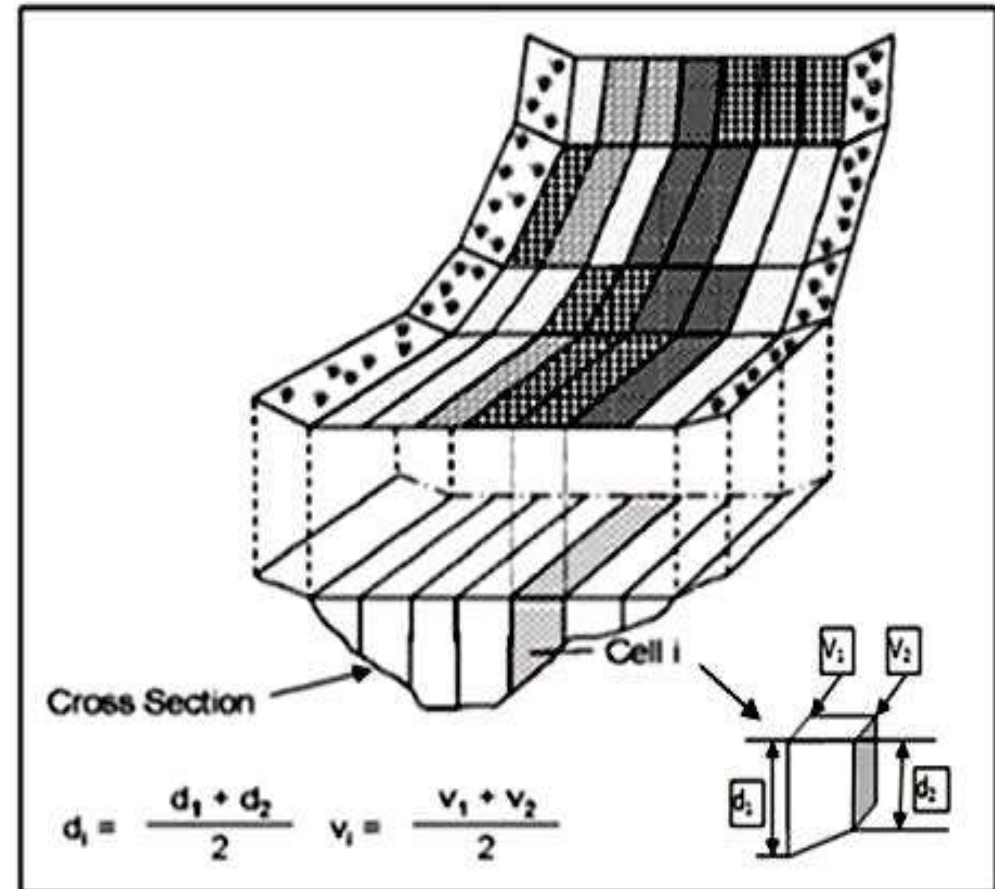
- A Cross section in a Pool at Kalagarh Site



Habitat Analysis-PHABSIM



- PHABSIM: **Physical habitat Simulation Model**
- Estimates **changes in physical habitat as a function of flow.**
- Results are in the form of '**Weighted Usable Habitat Area (m²/km) against Discharge**'.
- PHABSIM Inputs:
 - Cross sections
 - Discharge data
 - Habitat Suitability Criteria curves



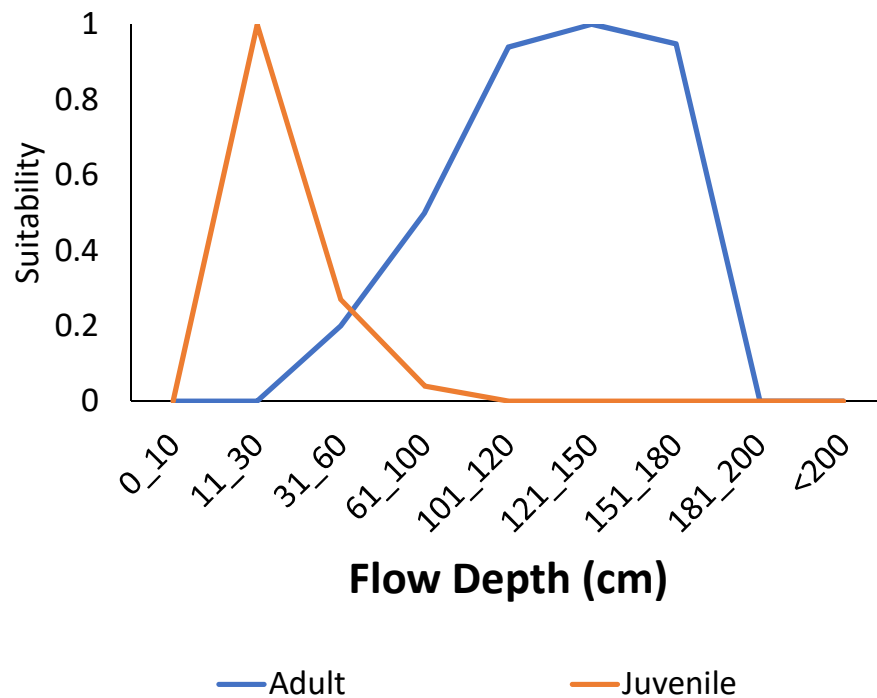
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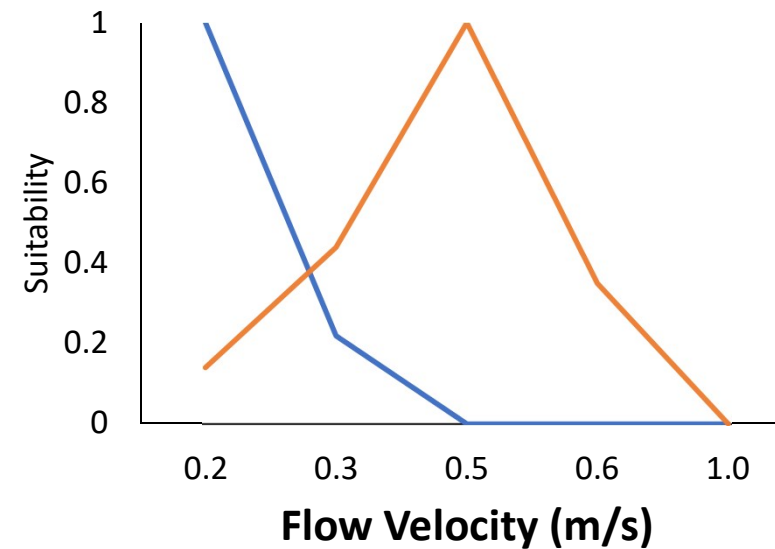
Habitat Analysis



Golden Mahseer Habitat Requirements-



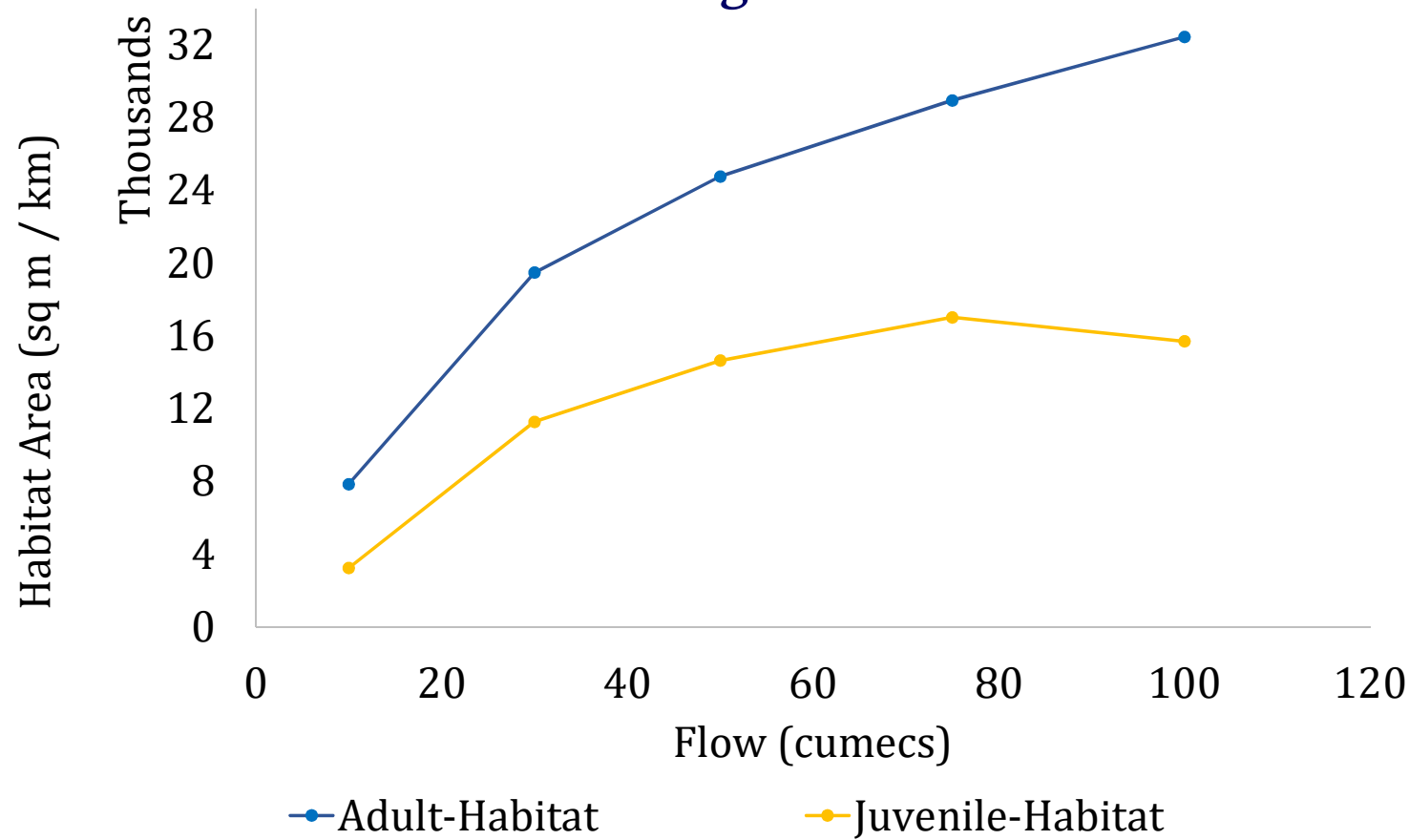
भारतीय वन्यजीव संस्थान
Wildlife Institute of India



Habitat Analysis Results



Kalagarh Site





Other Two Pilots

Mahanadi Delta Field Visit

- **Mahanadi Delta:** Field visit during 28 January-01 February 2019.
- Developed insights on hydrological and ecological scenarios of the delta.



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Mahanadi Delta –Data Collection



15 April-17 April 2019.

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Training Workshop- Mahanadi



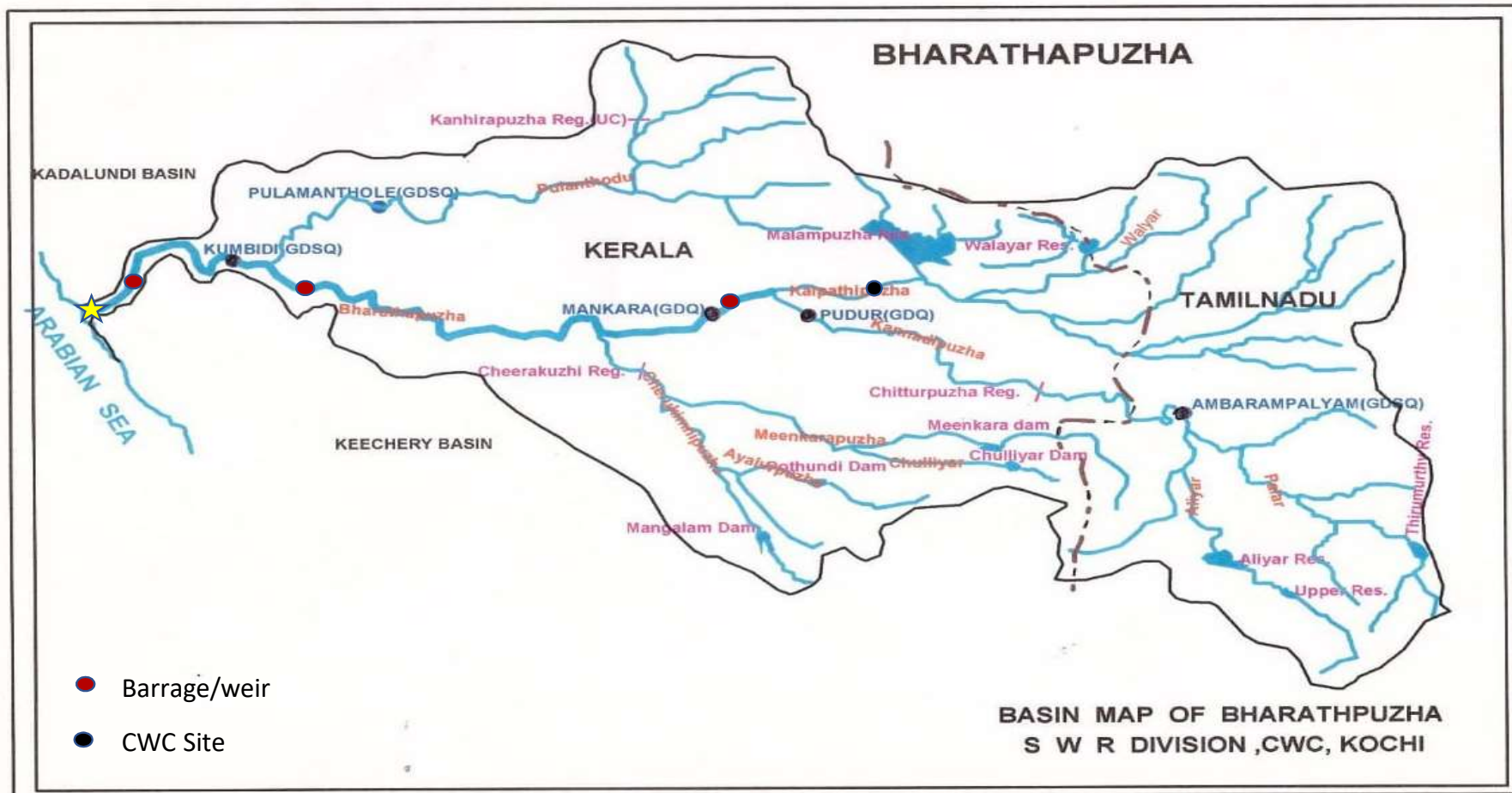
Training/Workshop on Environmental Flow Assessment-Approaches
(Focus: Ecological Approaches and Assessments – experiences from the EU)

CWC MERO Office, Bhuvneshwar - On 18 April 2019



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Bhrathapuzha- E-flow Sites



Bhrathapuzha Field Visit



Bharathapuzha Basin: Field visit during 07-11 January 2019 to identify the critical sites





Thank you for your attention !

Dr. Jyoti Nale

Project Advisor, IEWP-GIZ India



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