

# Environmental flows assessment & implementation

E-flows in Ganga river basin: Legal Framework,  
Challenges and implementation

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# Overview

- Law and Policy Framework
- Implementation and Monitoring
- Challenges and Issues



# Questions for future Scoping

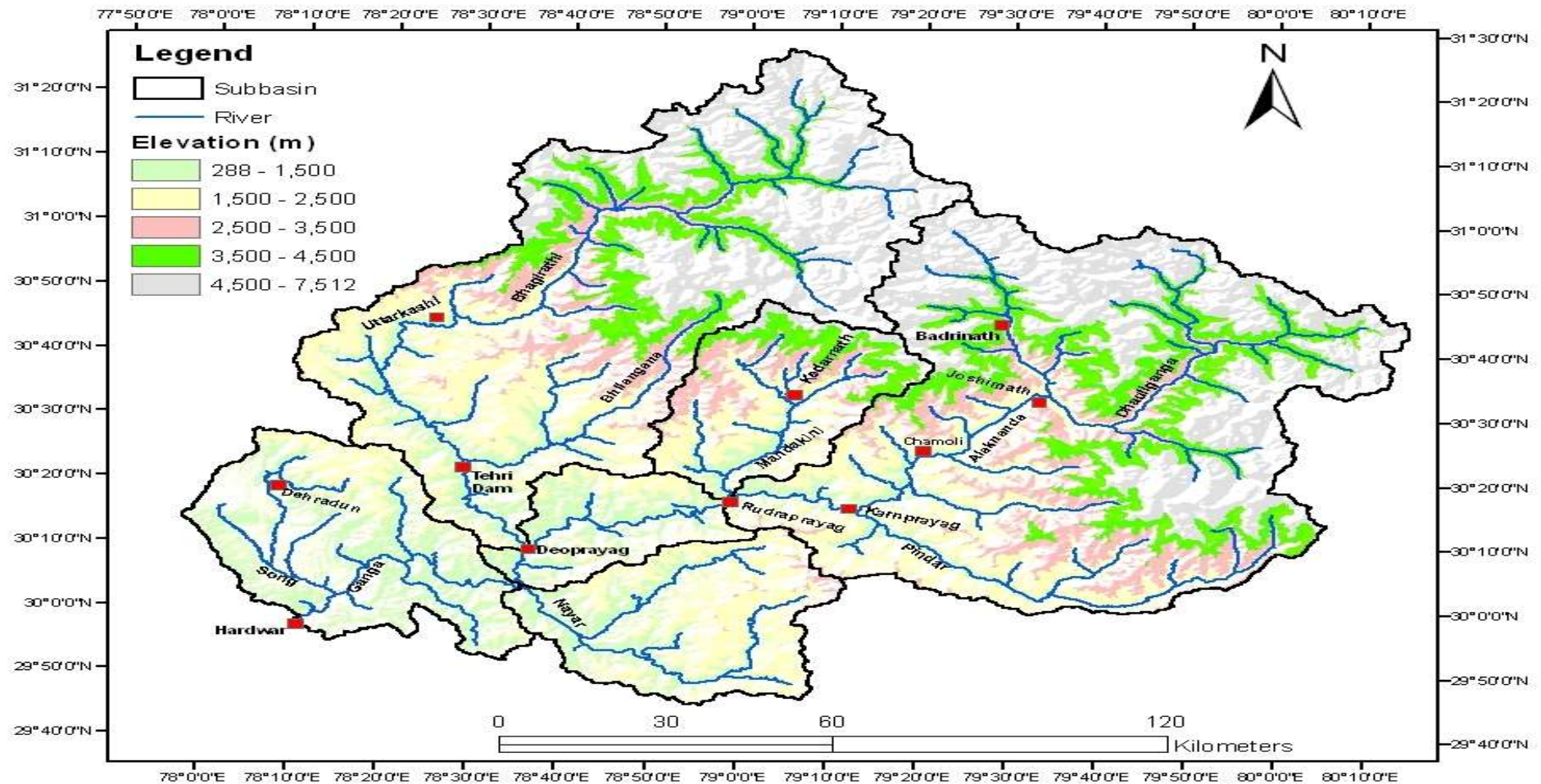
- Are the proposed environmental flows adequate for maintaining the ecological integrity of the Ganga River?
- Are present Legal/Policy framework sufficient to to implement an environmental flow regime?
- What tools can be developed to enhance our understanding of the system?



# Ganga Basin and E Flows

- Expressed as a set of flow releases/ continuous hydrograph, which mimics the elements of natural flow regime
- Different flows perform different environmental and social functions – elements of high, medium and low flows in E flow regime
- The more natural/ healthy river we want
  - More water we may need to leave in it
  - More natural variability we may need to maintain
- Maintenance of river in an agreed condition while maintaining balance between water resources development

# Upper Ganga River System





# Ganga downstream of Haridwar upto Unnao (UP)



# Earlier Efforts

- *E-Flows are the water regime provided within a river, wetland or coastal zone to maintain ecosystems and their benefits where there are competing water uses and where flows are regulated.*
- Earlier Studies :
  - Assessment of Cumulative Impact of Hydro-Electric Projects in Alaknanda-Bhagirathi Basins-AHEC, IIT- Roorkee (2012).
  - Assessment of Cumulative Impact of Hydro-Electric Projects on aquatic and terrestrial Bio-diversity in Alaknanda-Bhagirathi Basins- WII(2012).
  - Guidelines for E-flows in Himachal Pradesh by State Environmental Protection and Pollution Control board
  - Guidelines by MoEF &CC.

# Earlier Efforts

- Report of Inter-Ministerial Group on Upper Ganga (2013).
- IIT Consortium Study (2015).
- Assessment by Central Water Commission.
- Department of Water Resources, River Development & Ganga Rejuvenation constituted a three member Committee comprising which submitted a Policy Paper on Implementation of Environmental Flows for Himalayan Ganga.
- A Committee constituted by DoWR, RD&GR for E-flow assessment in Haridwar to Unnao reach.

Himachal Pradesh Govt – implementation- 2005

10% of minimum lean season flow as a mandatory environmental flow release.

(This was increased to 15% of average lean season flow in the year 2009).



# Legal framework

- River Ganga and its tributaries being dealt under provisions of the Water (Prevention and Control of Pollution) Act'1974 and Environment (Protection) Act'1986.
- The Central Government vide notification no. SO 3187 (E) dated 07.10.2016 (Authorities Order'2016) invoking powers under sub - section (3) of section 3 of the E(P) Act'1986 with a view to accelerate the pace of work for rejuvenation of River Ganga and tributaries, vested status of Authority to National Mission for Clean Ganga.

# Legal framework – Authorities Order'2016...

- Principles for rejuvenation, protection and management of River Ganga Basin, inter-alia includes:
  - River Ganga Basin be managed as single system and in an ecologically sustainable manner;
  - Continuity of flows in river Ganga be maintained without altering the natural seasonal variations;

# Legal framework – Authorities Order'2016...

- Maintenance of uninterrupted flow in river Ganga:
  - uninterrupted environmental flow in river Ganga and its tributaries shall be maintained at all times;
  - maintenance of uninterrupted flows in river Ganga and its tributaries by minimizing the diversion during lean period, using demand side management options and promoting various scientific or innovative options for recharge of groundwater and augmentation of flow in river Ganga and its tributaries;

# Legal framework – E flow regime...

- Vide Gazette Notification dated 9<sup>th</sup> October'2018, Government of India has notified minimum environmental flows for River Ganga to be maintained at various locations on the river.
- Environmental flows for Upper Ganga (from its origin to Haridwar, Uttarakhand):

Season	Months	(%) Percentage of Monthly Average Flow observed during each of preceding 10-daily period
Dry	Nov to March	20
Lean	Oct, April and May	25
High Flow	June to Sept	30

# Legal framework...

- E-flow Norms for Projects in Main Ganga Stem from Haridwar to Unnao:
- Minimum flow releases Immediately downstream of Barrages

Location of Barrage	<i>(In Cumecs)</i> Non-Monsoon (October to May)	<i>(In Cumecs)</i> Monsoon (June to September)
Bhimgoda (Haridwar)	36	57
Bijnor	24	48
Narora	24	48
Kanpur	24	48

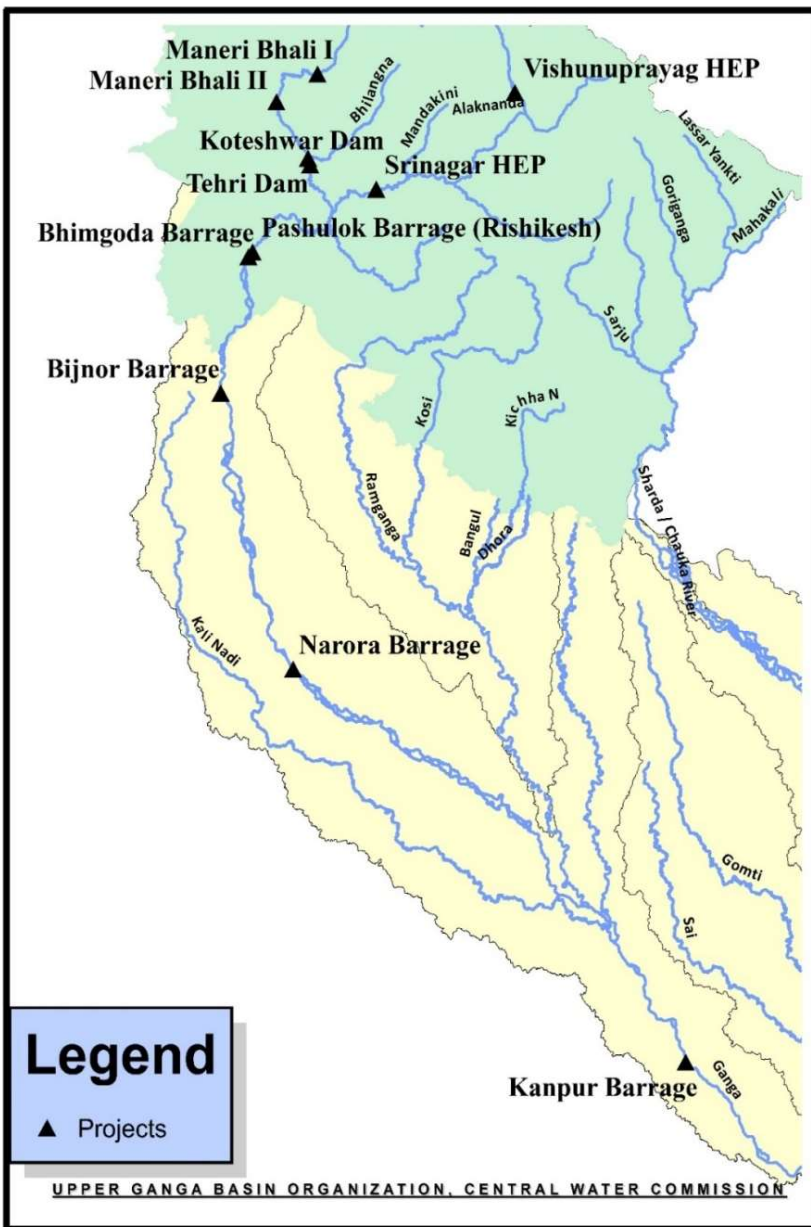


# Legal framework...

- Compliance of notified environmental flow regime is applicable to all existing, under-construction and future projects.
- Mini/ micro projects which doesn't alter river flow significantly are exempted.
- Existing projects which currently do not meet the norms will have to ensure that desired environmental flow norms are complied by 15<sup>th</sup> Dec'2019 (amendment notification ' 14<sup>th</sup> September' 2019).

# Implementation

- [19 Hydro Electric Projects](#) (2629 MW installed capacity) already operational in Upper Ganga River System. Out of these, 13 are having capacity less than 25 MW and can be classified as micro/ mini HEP.
- Central Water Commission (CWC) responsible for supervision, monitoring, regulation of environmental flows regime.
- CWC is monitoring major existing eleven projects w.e.f. 1<sup>st</sup> January, 2019 viz., Maneri Bhali Stage-I, Maneri Bhali Stage –II, Tehri Dam, Koteswar Dam, Vishnuprayag HEP, Srinagar HEP, Pashulok Barrage/ Chilla HEP, Bhimgoda Barrage, Bijnor Barrage, Narora Barrage and Kanpur Barrage. List to be reviewed periodically.
- Flow data on hourly basis being monitored from these projects. Presently, data is being transmitted through email or SMS. Automatic system for data acquisition and transmission to be installed by respective project authority.



## Listing of Projects for E-flow Monitoring

- All major and medium irrigation projects and major hydro power projects are to implement the stipulated E-flows.
- *The mini and micro hydro projects, minor irrigation schemes, water supply schemes which do not alter the flow characteristics of the river/stream significantly shall be exempted f.*
- **Initially 11 nos of existing major projects have been taken for E-flow monitoring . The list shall be reviewed periodically.**

Sl. No.	Name of the Project	Owner Agency
1.	Maneri Bhali Stage-I	UJVNL
2.	Maneri Bhali Stage –II	UJVNL
3.	Tehri Dam	THDC
4.	Koteswar Dam	THDC
5.	Vishnuprayag HEP	JPVL
6.	Srinagar	GVK
7.	Pashulok Barrage/ Chilla HEP	UJVNL
8.	Bhimgoda Barrage	UP. Irrigation
9.	Bijnor Barrage	UP. Irrigation
10.	Narora Barrage	UP Irrigation
11.	Kanpur Barrage	UP Irrigation

# Implementation – Monitoring report...

- However, in 3 projects namely Maneri Bhali Phase-2, Vishnuprayag HEP and Srinagar HEP, outflows have reduced significantly after mid-September after reduction of inflows though these have broadly met the e-flow norms on average basis.
- The said 3 projects viz. Maneri Bhali Phase-2, Vishnuprayag HEP and Srinagar HEP, have been found to be non-compliant during previous 2 quarterly monitoring reports also.
- Maneri Bhali Phase-1 and Pashulok barrage have been found to be non-compliant on few occasions in both reports.

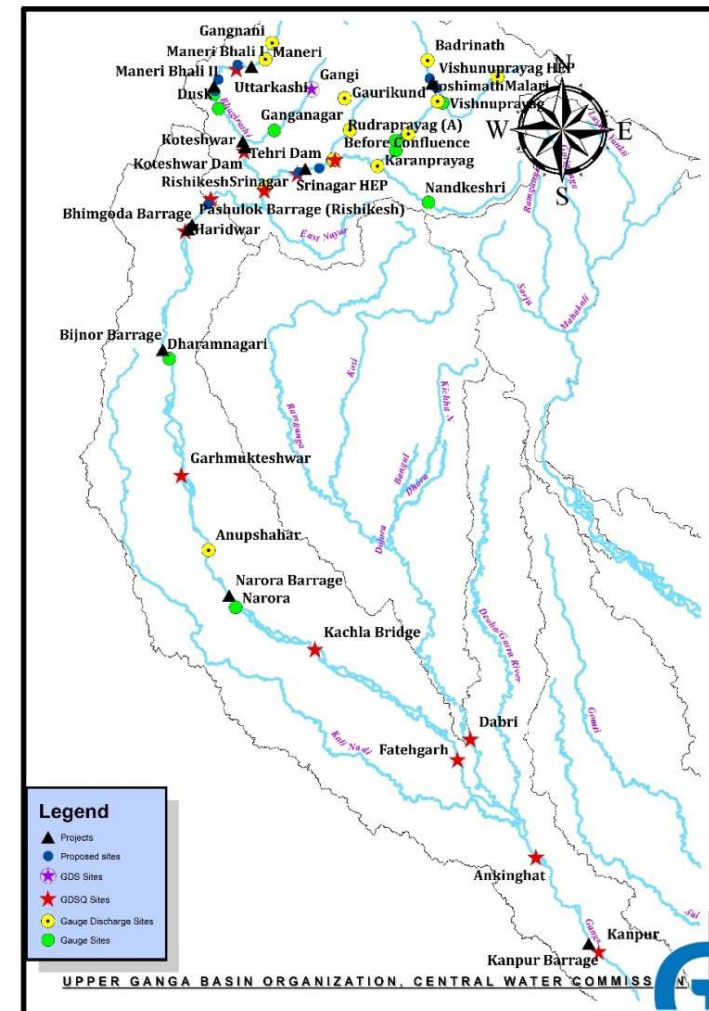
# Challenges

- During monitoring period starting from 1<sup>st</sup> Jan. 2019, though the data compliance has improved significantly, however, some of the projects are not meeting the e-flow norms particularly during lean period mainly because of commercial interest and water scarcity.
  - Automation of data collection and transmission, Data Management system
  - Data of inflows, diversions, downstream releases and changes in storage, its monitoring on hourly basis,
  - Web based E Flow Management system (transparent data flow free from human interference)
- Many of the existing projects were not planned and accounted for the recent e-flow norms and adherence these norms may impact their commercial interest and meeting their water demands.



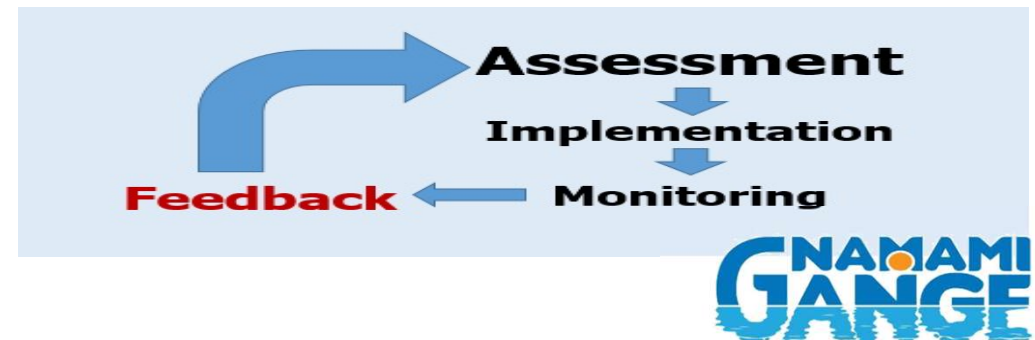
# Challenges - Strengthening/Modernization of CWC Data Network for Validation of Flow Data given by Project Authorities

- Existing network of CWC gauging stations being used for validation of flow data given by the project authorities.
- Network to be strengthened to fill gap locations.
- Network to be modernised to meet the monitoring regime



# Challenges

- Many of the existing projects were not planned and accounted for the recent e-flow norms and adherence these norms may impact their commercial interest and meeting their water demands.
- Standard Operating Procedures for monitoring and enforcement
- Finding right balance between the ecological needs of river and anthropological needs while assessing environmental flows – continuous fine tuning through R&D, feedback and stakeholder consultations
- Constitution of R&D group for continuous engagements



# Challenges

- Objective specific, Authenticity of data
- Biased views, expert background and judgement
- Multi stakeholder engagement and broad consensus
- Suitability of approach to address Multidimensional concerns
- Increasing water use efficiency in agricultural sector.
- Promoting reuse and recycle of treated waste water to decrease fresh water consumption.
- Greater focus on defining E Flow regime for tributaries viz., Yamuna, Ramganga etc. Studies already underway for Ganga basin tributaries



**Thank You**

# Projects in Upper Ganga River System

Total 70 hydel projects in Alaknanda and Bhagirathi river basin.

Status	Bhagirathi River			Alaknanda River			Total	
	Nos. (<25 MW)	Nos. (>25 MW)	Installed Capacity (MW)	Nos. (<25 MW)	Nos. (>25 MW)	Installed Capacity (MW)	Nos.	Installed Capacity (MW)
Under Operation	4	4	1845.75	9	2	783.45	19	2629.20
Under Construction	11	1	1097.00	7	5	1401.3	24	2498.30
CEA clearance/ TEC by State Govt.	2	2	368.00	2	4	1421.00	10	1789.00
Under development/ to be reviewed	3	4	1560.00	2	8	1,073.80	17	2633.8