



Challenges of Sedimentation in River Ganga and Remedial Approach

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INTRODUCTION

- GANGA, THE SACRED RIVER FOR INDIAN MASSES IS NOT ONLY FACING THE CHALLENGE OF **POLLUTION** BUT IS ALSO FACING **OBSTRUCTION TO ITS FLOW** BECAUSE OF A NUMBER OF STRUCTURES IN COURSE OF ITS STREAM.
- IMPACT OF STRUCTURES :
 - **IMPEDE THE FLOW OF THE RIVER** BUT ALSO BRING **ADVERSE ENVIRONMENTAL & ECOLOGICAL IMPACTS.**
 - REDUCED FLOW VELOCITY
 - EROSION OF SILT PARTICLES
 - SUSPENDED SILT PARTICLES IN THE RIVER SETTLE DOWN - **SEDIMENTATION IN THE RESERVOIR.**

INTRODUCTION Contd.



Tehri Dam, New Tehri, Uttarakhand



Farakka Barrage, West Bengal



Shrinagar hydro project (330 MW), Alaknanda

These are some of the structures impeding the flow of river Ganga

There are 37 [hydroelectric dams](#) in operation, under construction or planned to harness the energy of the Alaknanda river and its tributaries and generate electricity.

Factors responsible for sedimentation

- ▶ Various factors are responsible for sedimentation
- ▶ Size, shape and length of reservoir are important factors for reservoir sedimentation

Sediment management

- ▶ Sediment Management & Control is a challenging task
- ▶ Can not be handled by “**one-size –fits all**” approach
- ▶ Over the years neglect has necessitated **dredging** , however, **de silting** is preferable idea for sustaining ecosystem.



Desilting



Dredging

Sediment management contd.

- ▶ Factors which have large impact on **sediment load** in river are:
 - I. TOPOGRAPHY
 - II. RIVER CONTROL STRUCTURES
 - III. SOIL & WATER Conservation Measures
 - IV. TREE COVER
 - V. RIPARIAN LAND USE or LAND DISTURBANCE (Eg. Agriculture, Mining etc.)

Sediment management contd.

- ▶ On the one hand - River Control Structures like reservoirs, soil conservation measures and sediment control programme can **cause sediment load to decrease**.
- ▶ On the other hand - factors like land disturbance such as clearing of vegetation or agricultural practices can **cause increased sediment load**.
- ▶ Indiscriminate de siltation works may prove to harm ecology and environment flow.
- ▶ Need to evolve **better guidelines** based on global best practices - to address the issue of **better silt management**

Madhav Chitale Committee

- ▶ July, 2016 M/o WR,RD&GR constituted a **committee** Headed **by Shri Madhav Chitale**, Expert member of NGBRA
- ▶ Purpose - Preparation of Guidelines for works on de-siltation from Bhimgauda (Uttarakhand) to Farakka (West Bengal)
- ▶ **KEY OBJECTIVE** - To establish a need for ecology and eFlow of the river
- ▶ **Key observations made** (through study undertaken by the committee)
 1. Erosion, movement and deposition of sediment are natural regulating functions of river and sediment equilibrium of river should be maintained.
 2. Rivers should be provided with sufficient flood plains (Lateral connectivity) without any hindrance to the flow
 3. Instead of “**keeping the silt away**”, strategy to “**giving the silt way**” should be adopted.

Chitale Committee contd.

► Suggestions of the Committee

1. **Reach wise sediment transport processes** should be studied
2. **Annual sediments budget** to guide de silting activities should be established
3. **A technical institute** should be entrusted the following task:
 - ❑ **To conduct sediment budget**
 - ❑ **Morphological and flood routing studies that would examine and confirm the necessities of the de silting of the reach under consideration.**
4. Study the feasibility of introducing an arrangement - to facilitate the passing of incoming sediments safely to downstream of the dams/barrage structure to maintain the sediment equilibrium.
5. Ensuring that the concentrated sediment flux passed downstream will not create any major morphological changes on the downstream reaches
6. Modify bridges across river Ganga which are causing large afflux (more than 1% of normal depth) to reduce the afflux which in turn will also reduce the sediment deposition and erosion of banks on the upstream.

Chitale Committee contd.

- ▶ Suggestion to **entrust a body** comprising of :

The representatives of the Ganga Flood Commission

Member NITI Ayog (erstwhile Planning Commission)

Chief Ministers of Ganga river basin states



To carry out necessary studies with regard to sediment management in river Ganga and incorporate sediment management strategies in their comprehensive plans prepared for all sub basins of river Ganga.

- ▶ These integrated plans, the committee felt, could serve as **base documents for Central, State and District level Authorities** for considering proposals for Environmental Clearance for works related to river Ganga.
- ▶ Significant Development - Gazette notification dated 7th October 2016

Inferences drawn

- ▶ The shores formed maybe de silted/dredged by taking care of the river training works around it.
- ▶ **Sediments removed** may be **used for** the Farakka Feeder Canal or for strengthening the existing embankments around the barrage pond.
- ▶ **Sediment sluicing** may be incorporated to maintain sediment continuity from upstream to downstream reaches after carrying out necessary studies.

The way forward

- ▶ Consensus approach required to deal with this challenging problem of sedimentation.
- ▶ The observations made by Sri Jhunjhunwala during the Patna Conference in February 2017
- ▶ There is need to bring all stakeholders on one platform and arrive at consensus.
- ▶ Centre could try for an agreement, but active participation of key players like Govt. of , Bihar, West Bengal as well as Bangladesh is necessary to find out an amicable solution.

THANK YOU !