Chitale Committee recommends several measures for Desiltation of Ganga

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Chitale committee on Desiltation of Ganga has recommended a slew of measures which include study of reach wise sediment transport processes along with establishing annual sediment budgets to guide de-silting activities, Preparation of annual reports (Sand registry) describing the previous de-silting/ dredging activity and a technical institute may be entrusted to conduct the sediment budget, morphological and flood routing studies that would examine and confirm the necessity of the de-silting of the reach under consideration.

The committee was constituted in July 2016 by the Ministry of Water Resources River Development and Ganga Rejuvenation to prepare guidelines for desiltation of river Ganga from Bhimgauda (Uttarakhand) to Farakka (West Bengal). Shri Madhav Chitale (Expert Member, NGRBA) was appointed as Chairman of the committee. The other members of the committee were: Secretary, Ministry of Water Resources, River Development & Ganga Rejuvenation, Secretary, Ministry of Environment, Forests & Climate Change and Dr. Mukesh Sinha, Director, Central Water and Power Research Station, Pune. The committee was asked to establish difference between desilting and sand mining and also to establish need for desilting for ecology and e-flow of the river Ganga.

The committee in its report says erosion, sediment transport and siltation are very complex phenomena. It is impossible to apply a “one-size-fits-all‟ approach to sediment management and control, because the issues involved are frequently very regionally-specific. Local factors such as topography, river control structures, soil and water conservation measures, tree cover, and riparian land-use or land disturbance (for example agriculture, mining, etc.) can have a large impact on sediment loads in rivers. River control structures (such as reservoirs), soil conservation measures and sediment control programmes can cause downstream sediment loads to decrease, while factors such as land disturbance (clearing of vegetation, for example) or agricultural practices can cause increased sediment loads. At the same time, indiscriminate de-siltation works may result into more harm to ecology and environment flow. Thus, there is a need to evolve Guidelines, better broad principles, which should be kept in mind while planning and implementing de-silting works.

According to the report erosion, sediment transport and siltation in large rivers like Ganga are very complex phenomena and their estimation has inherent limitations and uncertainties. A reconnaissance of Main River Ganga on Google earth map reveal that different reaches are in a dynamic equilibrium phase. Sedimentation is mainly seen downstream of Bhimgauda barrage and near the confluences of tributary rivers with Ganga. The discharge congestion, large scale sediment deposition and its negative effects are mainly seen downstream of the confluence of Ghagra and beyond. The river flood plain drastically widens beyond the confluence of Ghagra and is estimated to be around 12 to 15 kms.

The committee says though de-siltation works can improve hydraulic performance of the river and this itself can justify undertaking de-siltation, these have no direct role in improving environment flow in the river. On the other hand, indiscriminate de-silting or sand mining would cause adverse impacts on river e-flow. Recognizing the importance of sediment transport in rivers, following basic principles of siltation in rivers should be kept in mind while considering de-siltation works:

- Catchment Area Treatment and Watershed Development works, along with good agricultural practices and river bank protection/anti-erosion works, are necessary to reduce silt inflow into the river system and must be undertaken in a comprehensive way.

- Erosion, movement and deposition of sediment are natural regulating functions of river and Sediment equilibrium of river should be maintained.

- Rivers should be provided with sufficient flood plains (lateral connectivity) without any hindrance to the flow.

- Instead of “keeping the silt away”, strategy to “giving the silt way” should be adopted.

In specific reference to de-siltation works in river Ganga, in addition to MoEF&CC Sand Mining Guidelines, which are statutory in nature, and the GSI Guidelines, the committee has suggested following Guidelines;

1. River Ganga tends to achieve equilibrium on its own given the hydrology, sediment and natural bed and bank disposition. It is necessary to provide the river sufficient areas of flood plain and lakes along the river to moderate the flood level. Any encroachment of flood plain, reclamation of lakes or disconnection of lakes from river should be avoided; rather adjoining

lakes/depressions may be de-silted to increase their storage capacities. The de-silting of lakes, etc., should be in such a manner that the sediment continuity is maintained and should not lead to head cut that creates safety issues for the river crossings, water intakes or river training works locally, downstream or upstream.

2. Upstream reaches of natural constriction works, like barrages/bridges, etc., tend to get silted leading to wandering of river. Possibly river training, cut-off developments and provision of extra water way near the constrictions could be tried after proper assessment without impacting the morphology of river elsewhere. The area freed from the development in the form of oxbow lakes should be used for flood moderation rather than reclaiming it for other purposes.

3. In case where constriction is causing large scale siltation, de-siltation along the preselected channel to deepen and attract the flow could be tried to guide the main course of flow. The dredged material may be dumped along the alternate channel which was to be closed to avoid bank erosion. Care shall be taken to develop stable channel which do not affect the flow either on upstream or downstream. Efforts should be made to provide silt continuity along the weirs and barrages.

4. Embankments, spurs and river training measures provided to protect the banks should not encroach upon the flood plains and delink the lakes, flood plains and other riverine environment from the river.

5. The proposed de-silting of any river reach need to be justified bringing out clearly the flooding caused due to siltation along with technical comparisons of the alternative flood mitigation measures with “do nothing” or “proposed de-silting/ dredging” being other options. It should invariably be associated with sediment flux studies and morphological studies to confirm no significant adverse effect on downstream or upstream reach of the river including the safety and effectiveness of river crossings, water intakes, existing river bank / flood protection measures etc.

6. De-silting of the confluence points, especially with huge silt carrying tributaries, such as Ghagra, Sone, etc., may be necessary to make confluence hydraulically efficient.

7. Reservoirs in main river Ganga and its tributaries, particularly in upper reaches, should be operated in such a manner that first floods, having high silt load, are allowed to pass through without storage and river flows in later phases of the monsoon are only stored for use during non-monsoon season. This would require quantitative long term forecast with decision support system to be established for optimum reservoir operations.

8. Agricultural practices along the river flood plains should be such that it does not disturb the passage of flood by increasing the resistance to flow causing aggradations.

9. River morphological studies should be carried out to initiate in-stream channel improvement works. It shall be ensured that the head cut induced upstream should automatically de-silt the reach. The headcut induced should progress upstream slowly so that the flora and fauna will have sufficient time to re-adjust its habitat.

10. The proposal should also contain environmentally acceptable and practically feasible silt disposal plan. River gravels/sands/silts could be used gainfully in construction works, including housing, roads, embankment and reclamation works. Under no circumstances, disposal should create any contamination of the water bodies, harmful to the flora and fauna existing adjacent to the disposal sites. It should also be ensured that disposed material should not come back into the river again.

11. In view of specific issues being raised about siltation in front of the Farakka Barrage, it is suggested that the shoals formed may be de-silted/dredged by taking care of the river training works around it. The sediment removed may be used for re-grading the Farakka Feeder Canal or may be used 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 de-silting / dredging works of the barrage pond shall not cause any structural problem to the barrage by excessive erosion on the downstream. In view of this the dredging shall be restricted only up to original bed level or higher.

12. Feasibility of introducing an arrangement need to be studied to pass the incoming sediment safely to downstream of the dams/ barrage structures to maintain the sediment equilibrium. It shall also be ensured that the concentrated sediment flux passed downstream will not create any major morphological changes on the downstream reaches.

13. Any bridges across River Ganga which are causing large afflux (more than 1% of normal depth) should be modified to reduce the afflux, which in turn will also reduce the sediment deposition and erosion of banks on the upstream.

14. The dredging/de-siltation/mining activities may result into some adverse impacts, i.e., (a) River bed degradation; (b) Bank erosion; (c) Channel widening; (d) lowering of water surface elevations in the river channel; (e) lowering of water table elevations adjacent to the river; (f) a reduction in the structural integrity of bridges, pipelines, jetties, barrages, weirs, foundations supporting high tension lines, existing bank protection works and other manmade structures; and (g) a loss of environmental values resulting from (a) through (e). Restrictions as presented in Appendix IV of this Report need to be enforced before planning and executing any dredging/ de-silting / mining activities. These restrictions may be modified only after proper study and monitoring the effects of dredging / de-silting / mining.

15. The Ganga Flood Control Commission, a sub-ordinate office of Ministry of Water Resources, River Development and Ganga Rejuvenation and secretariat and executive wing of Ganga Flood Control Board, headed by Union Minister of Water Resources, River Development and Ganga Rejuvenation with the Chief Ministers of Ganga river basin States and Member, NITI Ayog (erstwhile Planning Commission) may be entrusted with additional mandate 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 could serve as base documents for Central, State and District Level Authorities for considering proposals for environment clearances for works related to river Ganga.

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