



4 RECOMMENDATIONS

The detailed assessment with the help of different modeling scenarios have been extensively elaborated in previous chapters. Based on these assessments, three critical concerns have been viewed vis-à-vis flow requirements in downstream reaches. They are:

- Flushing of sediments
- Dilution needed for sewage disposal
- Aquatic ecological considerations

The following observations could be summarized referring to these main concerns in the area:

- Computation shows that average maximum velocity in the entire reach between Nathpa and Bael villages is of the order of 1.0 m/sec for a release of more than 4 cumecs. The velocity goes down as releases go down to 3 cumecs. Hence, this may not be a favourable condition with a point of view for flushing of sediments. For the releases varying from 4 to 10 cumecs, the values of average maximum flow velocity varies from 1.0 to 1.2 m/sec, which is adequate from the point of view of flushing the sediments of the sizes in the range of 0.7- 0.8 mm. But in the lean season, assuming there is no release from Nathpa dam, the flow in Satluj shall be mainly from tributaries meeting the river. This water would have lower silt content and hence even lower flow velocities shall be sufficient from flushing point of view.
- For fine sediments, the critical velocity has been calculated as 0.247 m/s. For sand, the five values of critical velocity at median diameters 0.1mm, 0.2 mm, 0.3 mm, 0.5 mm, 0.7 mm and 1.0 mm have been calculated as 0.17 m/s, 0.24 m/s, 0.29 m/s, 0.40 m/s, 0.49 m/s and 0.8 m/s respectively.
- DO level between the Nathpa and Bael stretch falls below 8 mg/l during lean season, although only at one small stretch near Ganvi confluence. But if releases from dam are maintained more than 4 cumecs, the DO level at any location doesn't fall below 8 mg/l. but it sustains at the level of more than 8 mg/l between Jhakri and Bael village.
- From aquatic ecological and fisheries point of view, the average velocities for different discharges are or the order of 0.6 to 1.2 m/sec for different discharges between the range 1 to 10 cumecs, which provides conducive environment for fish habitat and spawning etc.

Sno.	Purpose	Velocity required	Flow required	Flow suggested
1	Sediment flushing For fine sediments For sand	0.247 m/s 0.17-0.8 m/s	> 4 cumecs	Above 5 cumecs
2	DO levels	-	> 4 cumecs for DO above 8 mg/l	Above 5 cumecs
3	Aquatic ecological	0.6 m/s- 1.2 m/s	> 4 cumecs for DO above 8 mg/l	Above 5 cumecs



Identificaltion of critical stretches for different parameters					
Releases from dam in Cumecs			Critical point with specific reference to		
		Chainage Km	DO	Sediment flushing	Aquatic ecology
1	Silaring	2.9	X	X	✓
2	Sorang	12	X	X	✓
3	Garvi	23.2	X	X	✓
4	Garvi	23.2	X	✓	✓
5			✓	✓	✓

- ✓ Conductive
- X Not conductive

Keeping the above parameters in view, minimum suitable releases from dam above 5 cumecs could be adopted.

Based on flow observations taken during the lean season by IIT Roorkee, it could be observed that even with zero releases from Nathpa dam the flow at Jhakri is more than 5 cumecs, approximately higher by 50%.

It is recommended that to ascertain sediment deposition profiles along the entire Satluj stretch between Nathpa to Bael, a two dimensional modeling may be undertaken. This would take care of the curvilinear characteristics of the river. Though the data requirement for two dimensional simulations is extensive and would require substantial primary surveys, the results could be very useful for determining the exact and accurate flow regimes downstream of Dam.