

Estimating design and return period of environmental flows using flow duration curve method: A case study

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In this study, Flow Duration Curve (FDC) method was used to design the Environmental Flows (EFs) to maintain the river assert and services at desired level in downstream reaches of eight selected gauge sites in Damodar river basin, India. In the analysis, FDCs were drawn for (i) 1-day, moving-day averages such as 7, 30, 60 days using daily discharge data of each sampling sites for the complete 30 years period-of-record 1981-2010 and (ii) 7-day mean 1, 2, 10, 20, 50, and 100 years return period from same data sets. Annual FDCs (AFDCs) were also constructed for each calendar year of 30 record period and discharge values were extracted at every 5% probability of exceedance for stochastic evaluation, then plotted for calculating annual minimum discharge on Weibull probability paper were found to be usually straight line for each sampling sites except Tilaya site that enables confidence intervals and return periods to be associated with the FDC. The results indicate that for high probability of exceedance (5-75%), the discharge values of 30-day mean are higher as compared with 1-day 3, 7, 60-day mean values and the probability of exceedance equal to 95% of 7Q10 return period FDCs were found appropriate as designed EFs during drought/low flow periods. The results also indicate that stochastic FDC was more appropriate for extracting stochastic hydrologic information about the river ecology than FDC.

Biography

Ravindra Kumar Verma was born in Bokaro Steel City and his early schooling took place in Bokaro itself. He earned B.Sc. in Chemistry Honors and B.Sc. in Environmental Sciences from the Vinoba Bhave University, Hazaribagh and the Magadh University, Bodh-Gaya in year 2000 and 2005 respectively. In year 2005, He has also completed his MBA (Marketing) from Pondicherry University, Pondicherry. After which he worked at CIMFR, Dhanbad, for 1.5 years, before embarking on his Fellow (Doctoral Programme) in 2007. He has total 13 papers in national and international conferences proceeding, 2 book chapters, 2 papers are in international refereed journals. He is professionally interested in water resource management and modelling and simulation.

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