

Development of a decision-support system for enhanced operational management of the reservoirs of Bhakra and Beas dams

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Abstract This paper describes the design, development and application of a new type of decision-support system to assist dam operators in their effort to increase hydropower production, ensure water for irrigation, and mitigate flood risk. In a robust and resilient setting, the system applies remotely sensed data on snow cover, point telemetry data, and numerical weather forecast data to drive advanced hydrological and hydraulic forecasting tools, forecast optimization algorithms and uncertainty assessment tools. Decision makers are presented with accurate inflow forecasts, flood forecasts, optimal dam operation strategies and uncertainty estimates for the near term. Complementing these tools, a water allocation and demand module enables operators to identify optimal medium and long-term water use schemes given *a priori* requirements for irrigation, hydropower, flood management and other objectives. The toolsets are embedded in an IT framework designed for easy use by technical as well as managerial staff.

Key words decision-support system; real-time hydropower and irrigation optimization; flood forecasting; hydrological; hydraulic modelling; river diversion; planning