ICIWRM – 2000, Proceedings of International Conference on Integrated Water Resources Management for Sustainable Development, 19 – 21 December, 2000, New Delhi, India

Stochastic and Systems Approach to Hydrological Problems

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Under the theme 'Stochastic and Systems Approach to Hydrological Problems' 13 papers have been included in proceedings of the Conference. These papers cover various aspects of stochastic modelling of hydrological processes, which are time and chance dependent in nature. All the papers, in general, are of very high quality and free from mistakes.

Sechi and Zuddas present a general-purpose scenario-modelling framework to solve water system optimization problems under input data uncertainty. Uncertainty has been modelled by a scenario tree in a multi stage environment, which includes different possible configuration of inflows in wide time horizon.

Effective use of available water resources is a serious problem facing the world as it enters the 21st century. A recently completed research project at the University of New South Wales, Sydney evaluated the feasibility of predicting the seasonal rainfall. Ashish Sharma presents the summary of methods developed and the results obtained in course of developing a probabilistic prediction model for seasonal rainfall. The approaches presented are of great use in water resources management context.

The estimation of risks associated with alternate plans and design for water resources systems requires generation of synthetic streamflow sequences. The available monthly flow generation models do not preserve the dependence attributes at large time lags and poorly represent the observed distributional characteristics. Ashish Sharma and Robert O'Neill have developed a synthetic streamflow generation model, which is capable of modelling short term and inter-annual dependencies as well as nonstandard probability density functional form. It is, indeed, a good addition to the existing literature on monthly streamflow generation.

D. Nagesh Kumar and Sri Nivasa Raju apply artificial neural network for temporal disaggregation of rainfall data of Orissa State. Such a disaggregation of seasonal rainfall would be useful for operational purposes such as reservoir operation. The computed monthly rainfall and observed rainfall match quite closely. This indeed, is a very good and new application of ANN.

S.H.R.Sadequi, J.K.Singh and G. Das develop a rainfall runoff model for AMAMEH watershed in Iran based on Soil Conservation Service Curve number method. The authors discuss the difficulties encountered in the application of the method and suggest the possible modifications in the method.

Estimation of magnitudes of likely occurrence of floods is of immense importance for solution of a variety of water resources problems. Rakesh Kumar, C. Chatterjee, Sanjay Kumar, A.K. Lohani and R.D.Singh develop a regional flood frequency relationship for South Bihar using L. Moments. The relationships developed can be used for flood estimation for catchments of 10 to 3500 sq. km. in size. These relationships would prove to be quite useful for design of hydraulic structures in Bihar and Jharkhand. The authors have been really successful in bringing out something from nothing and need congratulations.

B.J.C. Perera has developed the methodology for deriving severity-frequency-duration (SDF) curves using water supply system simulation and partial duration series analysis. These curves would be quite useful for management of urban water supply systems.

At site flood quantiles from small samples have got large errors and uncertainty. This uncertainty can be reduced to large extent if historical floods are also considered in the analysis. B.P. Parida, very thoughtfully, explores the worth of extreme flood events in at site flood frequency analysis through computer simulation. The results obtained by Dr. Parida establish the need of incorporation of such information in frequency analysis.

Prediction of soil moisture retention and movement is very important for irrigation scheduling, crop planning runoff estimation and drought monitoring. B.K. Purandra and C.P. Kumar simulate soil moisture movement in a forested watershed, using SWIM (Soil Water Infiltration and Movement) model. The authors observe that predicted and observed soil moisture profiles match well.

Zhou Gangyan, N.K. Goel and V.K. Bhatt study the temporal and spatial sediment load characteristics of Yangtze River, Asia's largest river, using sediment load data of 40 years. It has been found that main source of sediment in Yangtze River is Jinsha and Jialing rivers, which account for nearly 73-90% of total sediment.

Stochastic dynamic programming (SDP) is widely used in deriving optimal operating policies for reservoirs. V. Ravi Kumar and K. Venugopal use SDP models with different inflow assumptions. The mixed inflow assumption has been found to have less dimensionality problem.

Conceptual modelling is one way of undertaking hydrological modelling. S.V. Vijay Kumar, U.V.N. Rao, and K.S. Ramasastri apply a simple 5-parameter model, based on concept of probability distributed method, to simulate the daily discharge of Gundlakamma river of Andhra Pradesh. The model has been found to perform well in simulating the runoff.

M.K.Verma, R.K. Shrivastava and S.M. Narulkar develop Premptive Goal programme (PGP) model for Mahanadi Reservoir Project (MRP) and compare its performance with earlier developed models such as HEC-3, MRPSIM and CDDP. MRPPGP model developed in this study has been found to perform better than other models.

As a concluding remark, I would like to add that all the authors have done commendable work. The presentations and deliberations would further refine the concepts presented in various papers and would enhance their applicability manifold.