Review of *Floods in a Changing Climate: Hydrologic Modeling* by P. P. Mujumdar and D. Nagesh Kumar

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In his foreword, Professor R. L. Wilby starts with a question: How much higher does the flood wall need to be built and how much larger does the reservoir spillway need to be? This is a pertinent and practical question that needs to addressed for flood management, but its answer gets complicated by the impacts of climate change on the hydrological cycle, reflected by the changes in the rainfall and streamflow regimes as well as in the watershed physiography itself. This book attempts to present methodologies for hydrologic modeling with particular focus on impacts of climate change on flood characteristics that will help answer this question.

The book comprises six chapters. Chapter 1 is introductory, providing the background of and a brief introduction to the topics covered in the book, including hydrologic models; remote sensing, geographic information systems (GIS), and digital elevation model (DEM) for hydrologic modeling; and assessment of climate change impacts. The chapter concludes with a short discussion of the organization of the book. This is a well-written chapter.

Chapter 2 deals with hydrologic modeling for floods from the perspective of planning and operations related to floods. It covers lumped models, such as the unit hydrograph method, the SCS method, the rational method, empirical intelligent models, flow routing models, and commonly used watershed models. Given the limitations of space, the chapter is a good synopsis. It could have been stronger with the inclusion of some well and useful models and techniques. Since the impact of climate change is most noticeable in the cryosphere, it would have been desirable to include snowmelt models.

Climate change and its impact are receiving a lot of attention these days. Chapter 3 presents methodologies for assessing hydrologic impacts due to climate change. Beginning with a discussion of emission scenarios, it goes on to discuss the projection of hydrologic impacts, dynamical downscaling approaches, statistical downscaling, disaggregation models including deterministic and stochastic techniques, macroscale hydrologic models, hypothetical scenarios for hydrologic modeling, modeling of floods under climate change, and uncertainty analysis. This is a very good chapter and contains a wealth of information.

Remote sensing for hydrologic modeling constitutes the subject matter of Chapter 4. Introducing basic concepts of remote sensing that are necessary to understand and analyze images obtained by remote sensing, such as spectral reflectance for vegetation, soil, and water remote sensing platforms, it goes on to discuss digital images, including color composites and image characteristics, image rectification, image enhancement, image information extraction, land use/land cover information, utility of remote sensing for hydrologic modeling, and demonstration of image processing using *MATLAB*. The chapter is written in an easy-to-understand manner and is a good introduction for those not well versed in remote sensing.

Chapter 5 deals with GIS for hydrologic modeling. Introducing the GIS technology, the chapter discusses representation of spatial objects in GIS, proximity analysis, DEM, representation of digital data, application of digital elevation models, other sources of DEM, integration of spatial, nonspatial and ancillary data into a distributed hydrologic model, GIS and remote sensing for flood zone mapping, and web-based GIS. This is a very useful chapter and the narrative is lucid.

Case studies and future perspectives constitute the subject matter of Chapter 6, the concluding chapter. Case studies include the Malaprabha reservoir catchment, India; Mahanadi River basin, India; and future perspectives. The two case studies are very illustrative. For example, the Malaprabha case study discusses streamflow projection methods, soil and water assessment tool (SWAT) and *ArcView* SWAT models, study region and data used, calibration and validation of SWAT, downscaling, disaggregation, streamflow generation with SWAT, and prediction of future streamflows for changed climates. In this manner, what is discussed in the preceding chapters is brought together to bear on dealing with the case study. The Mahanadi River basin study focuses on future flood peaks and water availability and uncertainty modeling. The chapter concludes with a discussion of future perspectives.

The Mujumdar and Kumar book is well written and reflects the authors' extensive experience in hydrologic and water resources systems modeling. It will be a good addition to the library of water resources engineers, hydrologists, watershed managers, and policy makers who are concerned with the impacts of climate change. The end-of-chapter exercises, albeit few, are good. The authors state in the preface that the book synthesizes various existing methodologies that can help with planning and operational decision making under the specter of climate change. We believe the authors have largely succeeded in accomplishing this synthesis and ought to be complimented for preparing a well-written treatise on a most interesting topic—the hydrologic modeling of floods in a changing climate.

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