

Foreword

The report titled “Hydrological Modeling – Current Status and Future Directions”, has been prepared as a guiding document for the activity of the ‘Centre of Excellence for Hydrologic Modelling’ under National Hydrology Project (NHP). The report has brought out a comprehensive review of surface water, ground water, water quality and systems models developed and successfully adopted for solving water management problems world over. Some of those models are generic, process based, less data driven and have proven effective and capable to simulate conditions prevalent in India. It is, therefore, desirable that the potential of adopting some of the models which have open access, be examined in detail. Some models are open source while others are not available free. Some of the open source models are very robust and have been tested widely.

The report covers the basics about various modeling components, issues related to modeling and different models used to deal with Surface water modeling, Groundwater modeling, Water Quality modeling, snowmelt-runoff modeling, soil erosion and sediment transport modeling and water resources systems modeling. All these domain modeling descriptions have been presented through 6 chapters; Chapter 1 presents hydrological modeling concepts in detail and reviews surface water modeling tools used in rainfall-runoff modeling, flood modeling and urban water hydrology; Chapter 2 provides basic theory used in ground water models development and tools and techniques along with description of groundwater modeling software. Snow/glacier melt runoff models are discussed in Chapter 3, while Chapter 4 is about soil erosion and sediment transport modelling. Basic concepts used in water quality modeling and different water quality modeling approaches are presented in Chapter 5. Finally, in Chapter 6, simulation and optimization techniques used in water resources systems and models based on these techniques are discussed. Each chapter concludes with a summary and way forward of modeling tools for wide application in India.

It is hoped that the report would be useful for the water resources professionals and would also provide guiding material for the future activities of the “Centre of Excellence for Hydrologic Modeling” that has been setup under NHP at NIH.

A large team of NIH scientists have put in considerable efforts to bring out this review report. I compliment all those who were involved in preparation of the report. Many experts reviewed the report and their help is gratefully acknowledged. We plan to periodically revise and improve the report to keep it updated and freely disseminate it through NIH/NHP web channels.

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January 29, 2018