

Preface

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In the dynamic realm of civil engineering, ongoing research endeavours strive to enhance safety, sustainability, and efficiency in urban areas and construction projects. Optimization techniques and statistical analyses have emerged as indispensable tools, facilitating data-driven decision-making and fostering advancements in the discipline. This book has addressed various pressing issues prevalent in developing urban areas, emphasizing the potential of statistical and optimization techniques to deliver economic and effective solutions.

The research presented in the first chapter is based on developing flood inundation maps in one of the main rivers of Bangladesh named “Buriganga”. The main purpose of these inundation maps is to depict the degree of flood damage based on flood depth classification. The inundation maps are based on different administrative Upazila. ArcGIS (Aeronautical Reconnaissance Coverage Geographic Information System) has been used for developing flood inundation maps. Results were obtained from the simulation of 1D/2D coupled hydrodynamic model in HEC-RAS (Hydrologic Engineering Center River Analysis System). Results acquired from the simulation were maximum flood depth, maximum flood flow velocity, and maximum inundation area for different historical flood events and return periods. Second chapter is presented to utilize the Soil and Water Assessment Tool to simulate streamflow in this basin via a watershed model called ArcSWAT. The outcomes of this study found helpful in water resource management and mitigation of flood in this basin. This chapter includes Sequential Uncertainty Fitting technique, which was applied for analysis of the data and allowed for calibration and global sensitivity using the SWAT-Calibration and Uncertainty Program (SWAT-CUP). The feasibility of this model was reported on the basis of R2 and NSE (Nash Sutcliffe efficiency).

Next chapter has explored several insights on settling phenomenon of particulate matter in ambient air. These insights are completely new or newly explained to the study. However, to narrate such several insights, the study has applied the subjective interpretation, combined with logical motions and innovation. Fourth chapter presents the evaluation of project cost management and cost trend analysis using qualitative and quantitative methods, survey will be distributed with engineers and interview with industry

experts. The expected results are used to evaluate and analyse the factors that affect project costs, and how to maintain the budget. Also, to understand the importance of cost trend analysis.

The last chapter presents an integrated approach for investigating surface water quality for drinking purposes and applying it to the Mahanadi River in Odisha using Information entropy, geographic information systems (GIS), and an examined of the use of TOPSIS and ELECTRE as multi-objective decision-making tools.

With a collective focus on addressing real issues in developing urban areas, the book aims to provide practical and effective solutions, facilitating progress and sustainability in civil engineering practices. All chapters were subjected to double blind peer-review process.

At this stage, we wish to thank all authors who have contributed for this book and confirmed their willingness to pursue the publication despite the unusual boundary conditions.