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Sedimentation in the Rupnarayan River

Volume 2: Estuarine Environment
of Deposition

 Springer

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Preface

Presently, the sedimentation on river bed is appealing the growing attention of most of the geomorphologists, hydrologists, engineers and planners as it is very important to control the geomorphological, hydrological and ecological characteristics of the river in managing a variety of detrimental problems like the shifting of river course, shortage of water for utilization in different purposes, hindrance of easy discharge of water and upstream flood, navigation difficulties, river bank erosion and loss of settlements and properties, etc. The main aim of the book is to understand and explain the causes, mechanisms and extent of river sedimentation in connection to the seasonal fluctuation of stream energy, environment of sediment deposition, sources of sediments and their distributional pattern.

Available shear stress and critical shear stress during high and low tides in different seasons in the stream have been calculated following DuBoys formula and Shield formula. Environment of sediment deposition is identified by Linear Discriminate Analysis and Bi-variate plotting of sediment grain size parameters. Sources of sediments are understood through identification of mineral composition of sediments by X-ray diffraction technique.

Rapid rate of sedimentation in the studied river is the result of combined interaction of riverine and marine processes. Seasonal fluctuation of available shear stress and sediment transport capacity during high and low tides in connection to grain size of sediments is the main causative and controlling factor of sedimentation. Sediments are deposited in moderate to lesser violent hydrodynamic condition in estuarine environment and are supplied from the upper catchment and the river banks. The result of the work will be extremely supportive and helpful to the engineers, hydrologists, planners and other concerned authorities, working on the aspects of sedimentation and management of associated problems not only in the study area but also in any of the tidal river in the world.

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Midnapur, West Bengal, India

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Abbreviations

CRF	Central Research Facility
DPM	District Planning Maps
GPS	Global Positioning System
GSI	Geological Survey of India
IIT	Indian Institute of Technology
KPT	Kolkata Port Trust
KTPP	Kolaghat Thermal Power Project
KTPS	Kolaghat Thermal Power Station
LDA	Linear Discriminate Analysis
PCA	Principal Component Analysis
XRD	X-Ray Diffraction

Symbols

D	Median grain size (m)
<i>D</i>	Water depth
R	Hydraulic radius
S	River bed slope
d	Distance between planes of atoms
g	Gravitational acceleration
h	Horizontal distance
θ	Slope
θ	Angle of incidence
ϕ	Sediment grain size unit
λ	X-ray wavelength
ρ	Water density
ρ_s	Sediment density
μ	Dynamic viscosity
γ	Specific weight of the water
γ_s	Specific weight of sediment
τ_0	Available shear stress
τ_{cr}	Critical shear stress
x_0	Reference grain size fixed at 1 millimetre

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