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Ramkrishna Maiti

Sedimentation in the Rupnarayan River

Volume 1: Hydrodynamic Processes Under a Tidal System

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Preface

A river is a dominant geomorphic process and is engaged in reshaping the earth's surface by transfer of mass and energy for its long geologic past. Sedimentation on river bed is very important to control the geomorphological, hydrological and ecological characteristics of the river and the surrounding areas. At present, river sedimentation is one important problem in the world and has been accelerated by human activities like, forest cutting, unscientific agriculture, mining, road construction and rapid urbanization. Sedimentation creates a variety of detrimental problems and impacts on society, economies and the environment. The main aim of the book is to understand and explain the causes, mechanisms and extent of river sedimentation in connection to all the hydrodynamic characteristics of the river.

Channel forms and patterns including symmetrical and asymmetrical shape of the cross-sections, channel diversion and flow separation, distribution of depth, width-depth ratio etc. have been studied and measured in detail. Hydraulic characteristics of the stream like, nature and pattern of flow, distribution of water velocity, seasonal variation of water velocity and discharge have been measured carefully directly in the field. Tidal data have been measured and collected at different gauge stations to understand the nature and characteristics of tidal range, tidal prism and tidal asymmetry. Suspended and bed load of the river are measured and estimated following suitable techniques. Sediment grain size has been calculated by collecting sediment samples and analyzing them using sieving technique.

Sedimentation in the tidal river is the result of combined interaction of riverine and marine processes. Channel asymmetry, channel diversification and separation of flow, seasonal variation of water discharge during high and low tide, tidal asymmetry and associated variation of sediment transporting capacity are the main causative and controlling factors of sedimentation. The result of the work will be

extremely beneficial to the engineers, hydrologists, planners and other concerned authorities, working on the aspects of sedimentation and management of associated problems in different climatic, geological, geomorphological, hydrological, bathymetric and hydraulic characteristics.

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Midnapur, West Bengal, India

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Abbreviations

ASTM	American Society for Testing Materials
CRF	Central Research Facility
DPM	District Planning Maps
GPS	Global Positioning System
GSI	Geological Survey of India
IIT	Indian Institute of Technology
IRS	Indian Remote Sensing (Satellite)
KPT	Kolkata Port Trust
KTPP	Kolaghat Thermal Power Project
KTPS	Kolaghat Thermal Power Station
LDA	Linear Discriminate Analysis
LISS	Linear Imaging Self-Scanning Sensor
NATMO	National Atlas and Thematic Mapping Organization
NRSA	National Remote Sensing Agency
PCA	Principal Component Analysis
SI	Sinuosity Index
SOI	Survey of India
WBPDCL	West Bengal Power Development Corporation Limited

Symbols

D	Median grain size (m)
D	Water depth
H	Tidal wave amplitude
H	Constant hydraulic head
P	Tidal prism
Q	Water discharge
R	Hydraulic radius
S	River bed slope
V	Mean velocity