

DECLARATION

I declare that the thesis entitled "*Impact of Hydrological Changes and Adaptation practices of the Rural People in the Lower Teesta River Basin of West Bengal, India*" has been prepared by me under the guidance of **Prof. (Dr.) Ranjan Roy**, Professor of Department of Geography and Applied Geography, University of North Bengal. No part of this thesis has formed the basis of any degree or fellowship awarded previously.

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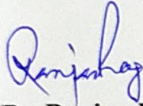
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CERTIFICATE

I certify that **Dipankar Das** has prepared the thesis entitled "*Impact of Hydrological Changes and Adaptation Practices of the Rural People in the Lower Teesta River Basin of West Bengal, India*" for the award of Ph.D degree of the University of North Bengal under my guidance and supervision. He has carried out the research work at the Department of Geography and Applied Geography, University of North Bengal and the thesis has been prepared based on the primary and secondary source of information by the researcher.

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




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Impact of Hydrological Changes and Adaptation Practices of the Rural People in the Lower Teesta River Basin of West Bengal, India A Thesis Submitted to University of North Bengal, Darjeeling For the Award of Doctor of Philosophy Submitted by Dipankar Das Under the Supervision of Prof. (Dr.) Ranjan Roy Department of Geography & Applied Geography University of North Bengal Raja Rammohunpur Darjeeling 2023
CHAPTER-I INTRODUCTION 1.1 General The present study will focus to summarize

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the situational analysis of downstream areas of Teesta sub basin of greater Brahmaputra basin. The situational analysis contains changes of the hydrological regime, conditions of the

local people and their coping strategies and adaptation practices in the hazard prone area of Lower Teesta River Basin, which is a part of India. Consequently, the present study includes

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PREFACE

The Teesta River recognized as an entity of sustenance in the landscape is located at the position of the Himalayan and Sub-Himalayan region and exhibits typically considerable changing hydrological character. In this regard, morphometric analysis has been prepared for the basin area of Teesta River and various morphometric data have been calculated by using of topographical maps published by the survey of India and Remote Sensing and GIS platforms. Numerous hydrological changes are identified with the study of the physical properties and human interventions and are explained in Chapter-III in detail. The modifications along the Teesta are formed by anthropogenic activities and provide different changes in hydro-morphological characteristics over the basin area. These changes are represented as various hazardous conditions predominantly flood over the flood plain of the concerned river and in parallel for the most part of the basin agriculture signify as a dominant function in this regard are discussed in Chapter-IV. The flood plain of River Teesta constitutes an important source of natural resources which yields high economic and livelihood values to local people who inhabit surroundings of the river of the study area. However, local rural people are facing different kind of problems due to hydrological and hydro-morphological changes nowadays. Therefore an attempt has been made in the Chapter-V to bring out some unexplored facts about the restoration, conservation and management of the flood plain through sustainable adaptation practices in agriculture that very much resemble the hydrological changes, which are more useful to socio-economic development as well as serve for risk reduction for human habitation and sustainable use of land of the surrounding riparian areas.

The present researcher seeks to undertake a detailed study of the hydrological processes of the Teesta River with their associated changes and problems and to make value added appraisals of the socio-economic resilience of the channels' surrounding areas with some recommendations for sustainable adaptation and management.

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Acronyms and Abbreviations

PRA	Participatory Rural Appraisal
FGD	Focus Group Discussion
KII	Key Informant Interviews
HI-AWARE	Himalayan Adaptation, Water and Resilience Research
GL	Gauge Level
DL	Danger Level
EDL	Extreme Danger Level
PDL	Primary Danger Level
mbGL	Meter Below Ground Level
masl	Mean Above Sea Level
GIS	Geographical Information System
DEM	Digital Elevation Model
AHP	Analytical Hierarchy Process
AWM	Agricultural Water management
LULC	Land Use and Land Cover
SPIP	Solar Power Irrigation Pump
ZT	Zero Tillage
CI	Consistency Index
MCA	Multi-Criteria Analysis
NGO	Non-governmental Organization
ICIMOD	International Center for Integrated Mountain Development
IPCC	Intergovernmental Panel on Climate Change