

River & Research

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Editors



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EDITORIAL NOTE

It is with immense pride and anticipation that we present "River & Research," an extraordinary testament to the profound interplay between human exploration and the vibrant ecosystems of rivers. Published by the South Asian Institute for Advanced Research & Development (SAIARD), this book stands as a pinnacle of scholarly dedication and environmental advocacy.

"River & Research" is a collaborative endeavor, showcasing the collective wisdom and tireless efforts of esteemed researchers, ecologists, and scholars from around the globe. SAIARD's commitment to fostering interdisciplinary dialogue and promoting innovative research shines brightly within these pages.

This comprehensive volume serves as a captivating chronicle, delving into the multifaceted relationships between rivers and the progress of human civilization. Through meticulous research, compelling narratives, and cutting-edge insights, the book illuminates the pivotal role that rivers have played throughout history — as cradles of civilization, sources of inspiration, and conduits for scientific discovery.

As you journey through the chapters, you'll traverse continents and eras, uncovering the intricate connections between scientific inquiry and the preservation of these precious waterways. "River & Research" doesn't merely dwell on historical anecdotes; it grapples with contemporary challenges, urging proactive measures to protect and sustain these vital ecosystems.

SAIARD's commitment to excellence is vividly displayed through the book's rich visual content, scholarly rigor, and thought-provoking analyses. Every page invites contemplation, urging readers to reflect on the symbiotic relationship between rigorous scientific investigation and the conservation of our planet's natural resources.

"River & Research," a cornerstone of SAIARD's dedication to advancing knowledge and fostering environmental stewardship, stands as a beacon of hope and a catalyst for positive change. We extend our gratitude to the authors, researchers, and contributors whose dedication has brought this remarkable work to fruition.

With great enthusiasm, we invite you to embark on an enlightening and transformative journey through the captivating pages of "River & Research."

PREFACE

In the vast tapestry of our world, rivers flow as the lifeblood of civilizations, sustaining ecosystems, nurturing cultures, and inspiring human ingenuity. It is with immense pleasure and deep reverence for these vital waterways that the South Asian Institute for Advanced Research & Development (SAIARD) proudly presents "River & Research."

This book stands as a tribute to the enduring relationship between humanity's quest for knowledge and the majestic presence of rivers. As an institute committed to the advancement of knowledge and the promotion of sustainable development, SAIARD recognizes the pivotal role of rivers in shaping our past, influencing our present, and charting the course for our future.

"River & Research" is the culmination of collaborative efforts, a collective endeavor involving dedicated researchers, scholars, and experts in diverse fields. Through their unwavering commitment and expertise, this book embarks on a profound exploration of the intricate connections between scientific inquiry and the preservation of rivers. Within these pages, readers will embark on a captivating journey across continents and epochs, traversing the currents of history, culture, and scientific discovery. The book eloquently portrays how rivers have been at the forefront of human civilization, fostering trade, nourishing agriculture, and providing inspiration for artistic expression.

Moreover, "River & Research" confronts the pressing challenges faced by these invaluable waterways in the modern era. From pollution to overexploitation, from the impacts of climate change to the loss of biodiversity, the book calls for a united global effort to safeguard these precious ecosystems for generations to come. As we navigate the pages of this remarkable volume, let us heed the call to action embedded within its narrative. Let us recognize the symbiotic relationship between our quest for knowledge and our responsibility to protect and preserve the natural world.

We extend our heartfelt gratitude to the authors, researchers, and contributors whose dedication and expertise have brought forth this illuminating work. May "River & Research" serve as a catalyst for dialogue, action, and a renewed commitment to the stewardship of our planet's rivers. With great anticipation, we invite you to delve into the pages of "River & Research" and embark on a journey that celebrates the profound interplay between rivers and the relentless pursuit of knowledge.

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MICRO-EXAMINATION OF FISHES IN THE RAMGANGA RIVER SYSTEM

Prof. Neelima Gupta

Vice Chancellor, Dr. Harisingh Gour Sagar Vishwavidyalaya
(A Central University), SAGAR. MP. India

Abstract

India is rich in riverine aquatic resources and fish has a special importance as a supplement to ill- balanced cereal. In India, water resources themselves have potentialities of aquatic food approximating to 7.5 millions hectares. However, the reckless use of natural resources and dangerous chemicals concomitant with industrialization and population explosion has added substantial dimensions to the problem of pollution which has acquired the status of a global problem. Much concern has recently been generated over adverse health effects arising from effluent polluted waters. Under extreme conditions, there have been cases of mass mortality of fishes.

Ramganga is the first major tributary joining Ganga originating from Doodhatoli ranges of Kumaun Himalayas in the district of Pauri Garhwal, Uttarakhand and flows south west. It originates from the high altitude zone of 800m-900m. The length of the river from the source to the confluence with the Ganga is 596 km. and the catchment area of the basin is about 32,493 sq. km. During its course of flow, it traverses through Kalagarh, Moradabad, Bareilly, Jalalabad (Shahjehanpur) and finally merges with river Ramganga at Kannauj. Five experimental stations (I Kalagarh, II Moradabad, III Bareilly, IV Jalalabad and V Kannauj) were selected on the river banks for fish collection and micro-examination for fish parasites.

*Fish parasites are found in classes Trematoda, Acanthocephala, Cestoda and Nematoda. Important parasites of the trematodes are found in the orders Digenea and Monogenea. Some fish parasites are important disease producing agents in man. A total of 30 *Pallisentis* from 18 hosts of Kalagarh, 26 from 14 hosts of Daswa Ghat, 29 *Pallisentis* from 23 hosts of Katghar were isolated during the study period from *Channa punctatus*. *C. punctatus* collected from Chaubari (Bareilly) showed highest mean intensity where 128 *Pallisentis* were recovered from 45 hosts.*

*Out of 49 *Channa punctatus* from Daswa Ghat one fish was found infected with *Clinostomum complanatum* while another one was found to be infected with trematode*

	0.04-0.11	10.70	20.13	1.88	
	0.11-0.16	21.39	37.95	1.77	
	0.16-0.21	25.07	26.07	1.03	
	0.21-0.27	19.76	11.88	0.60	
	0.27-0.45	8.63	1.65	0.19	
Distance from Fault line (m)	0-500	19.51	21.12	1.08	3.18128
	500-10000	19.64	29.57	1.50	
	10000-15000	20.55	21.83	1.06	
	15000-20000	18.69	19.71	1.05	
	>20000	12.51	7.74	0.61	
TWI	<2	13.09	9.02	0.68	4.39142
	2-4	31.97	36.41	1.13	
	4-6	50.09	54.55	1.08	
	>6	4.86	0	0	

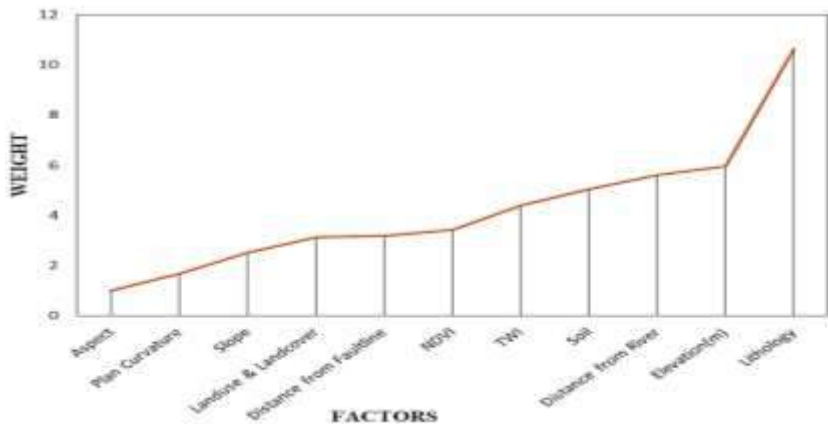


Fig 7: Weight used for individual factors for the landslide of Mandakini basin, Source: Source: USGSEarth Explorer SRTM DEM & Landsat OLI Images, Bhukosh GSI Landslide Point Data, Modified by Researcher

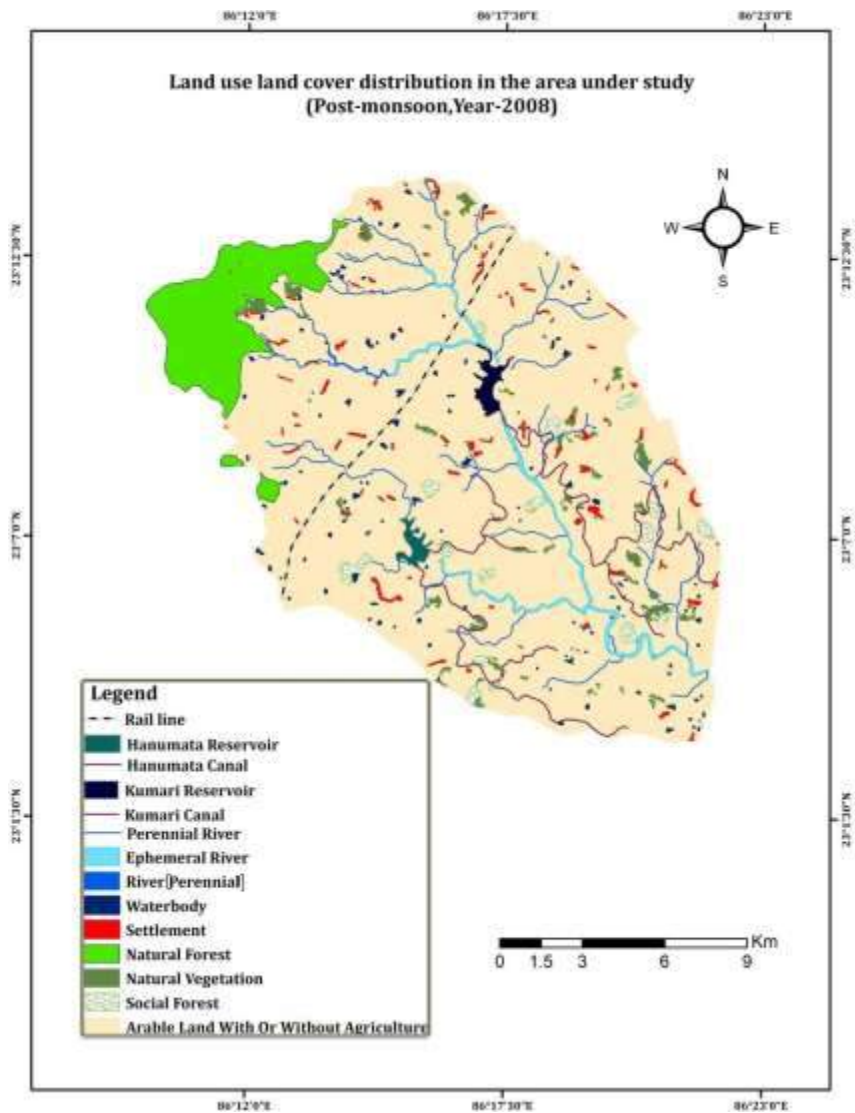


Fig-5c:- Land use map of 2008

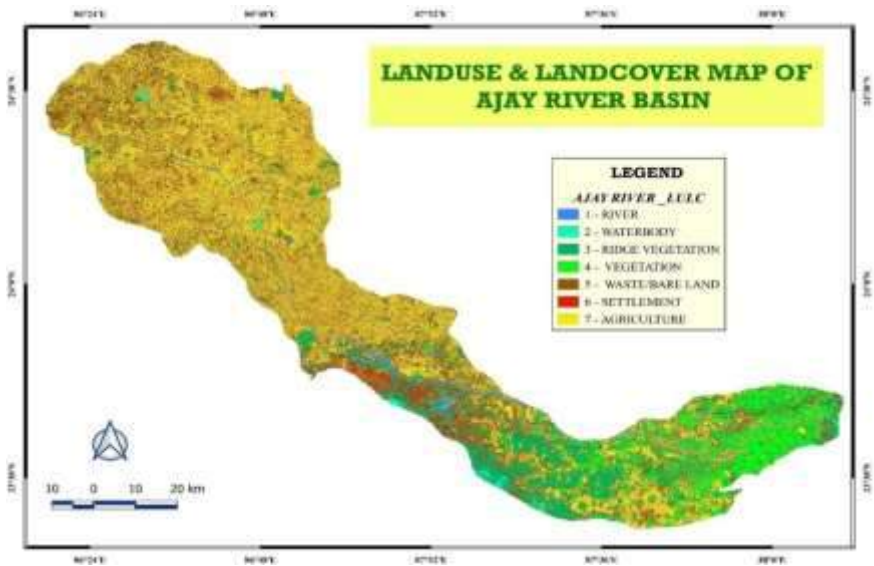


Fig 10: Landuse and Landcover Map of Ajay River Basin

7.6.1. NDVI

Vegetation has a key role to play in the subsurface water recharge practice because it augmented the infiltration rate by clutching the precipitated water. Water bodies along with fallow lands and vegetative covers are more constructive than agricultural lands and built-up area for groundwater recharge. Weightage has been assigned in order to water

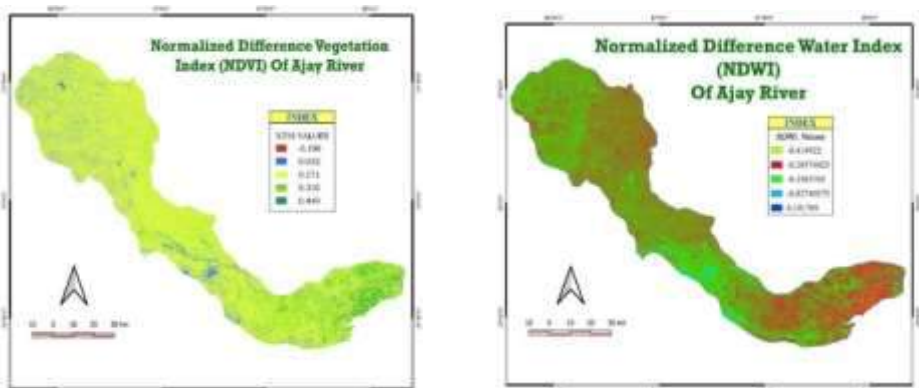


Fig 11: NDVI & NDWI Map of Ajay River Basin

SOIL LOSS ESTIMATION OF BHAGIRATHI HOOGHLY RIVER USING RUSLE MODEL

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Abstract

Globally, soil loss is a significant problem contributing to nutrient loss, water quality degradation, and sand accumulation in water bodies. Agricultural intensification, soil degradation, and some other human impacts all contribute to soil erosion, which is a significant issue. Management and conservation efforts in a river system can benefit from a soil loss estimation study. Modelling can establish a scientific and accurate method to reduce soil loss. In this study, GIS and remote sensing techniques have been integrated with the Revised Universal Soil Loss Equation (RUSLE) model to estimate soil loss in the entire stretch of Bhagirathi Hooghly river, West Bengal, India. To determine soil erosion-prone areas, rainfall, soil texture, land use and land cover maps, as well as a digital elevation model (DEM) were used as input. The five factors are being considered as input parameters of RUSLE model such as Rainfall erosivity (R), Soil erodibility (K), Slope length and slope steepness (LS), Cover management (C) and Support practices (P). Accordingly, the study area was categorized into five soil loss severity classes: very low (<10%), low (10-20%), moderate (20-30%), high (30-40%) and severe (>40%) risk classes. After analysing all the factors, it has been discovered that the lower part of Bhagirathi Hooghly river happens to be mostly affected by soil loss. The results of study area can be helpful to conservation of soil management practices and watershed development program in the basin area.

Keywords: GIS; remote sensing; RUSLE; soil loss; Bhagirathi Hooghly.

Introduction

Soil erosion is one of the most severe problem in the country, with changing economic implications and food security. The bio-physical environment, including climatic