



SIPG



International Conference

Transboundary Rivers of South Asia: Fostering Regional Collaboration for Environmental Sustainability

ORGANIZING COMMITTEE

South Asian Institute of Policy and
Governance (SIPG), North South
University

Department of Geography, The
University of Manchester, UK

National River Conservation Commission
(NRCC), Bangladesh



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**North South University,
Bangladesh**



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Associate Partner: South Asian Network for Public Administration (SANPA)



MESSAGE FROM THE ORGANIZING COMMITTEE

We are pleased to present to you the book of abstracts for the International Conference on ‘*Transboundary Rivers of South Asia: Fostering Regional Collaboration for Environmental Sustainability*’, 7 and 8 May, 2024. As you can see, the abstracts cover a wide range of areas in transboundary rivers of South Asia to practitioners and researchers, faculty and students. We hope you will review this book and use it to guide your selection of conference sessions.

Population growth, climate change, and political conflicts are creating severe impacts on transboundary river basins and endangering large portions of the Global South with multi-hazards risk. Thus, multi-sectoral, multi-discipline, and cross-country perspectives are needed to develop collaborative policies for achieving sustainable development goals. The international conference aims to foster meaningful dialogue among leading scholars, policymakers, researchers, and practitioners from South Asia to discuss the crisis points of transboundary river disputes, water governance and environmental sustainability. This conference also aims to develop a policy-level methodology on how cross-country SDGs dialogue can help to improve water governance in the global south. The outcome will also lead to future opportunities for cross-country dialogue between Nations in South Asia on water and transboundary river-related issues. It will also foster on how different agencies can collaborate and exchange cross-border dialogue to promote environmental sustainability.

I'd like to take this opportunity to emphasize the importance of self-care during the upcoming conference. While the schedule may be busy with sessions and activities, it's crucial to prioritize your well-being and find moments to unwind. Dhaka offers various options for relaxation, such as massages and beautiful parks.

Although the conference program may be enticing, I encourage you to allocate time for self-care. Consider taking breaks between sessions to recharge – whether it's going for a leisurely walk, practicing mindfulness, or simply enjoying a cup of tea or coffee with colleagues and new acquaintances. Engaging in stimulating conversations about your work in transboundary rivers of South Asia can also serve as a source of rejuvenation, fostering both mental and physical wellness. Additionally, social interactions provide valuable opportunities to forge new connections and strengthen existing relationships, contributing to overall well-being.

Have a great conference.

Dr. Meheub Sahana, Department of Geography, The University of Manchester, UK;

Professor Sk. Tawfique M. Haque, Dean (IC), School of Humanities & Social Sciences; and Director, SIPG, North South University, Dhaka, Bangladesh;

Mr. Sarwar Mahmud, Chairman, National River Conservation Commission (NRCC), Bangladesh;

Dr. Md. Abdus Samad, Department of History, Jagannath University, Dhaka, Bangladesh.

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**ORAL
PRESENTATIONS**

PANEL DISCUSSION
BY
NRCC, BANGLADESH

Water Disaster, Transboundary River Basins, and Environmental Sustainability in South Asia: Understanding through machine learning model and geospatial application

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Abstract

River basins and water are centers of sustainable development; making transboundary cooperation among upper and lower riparian areas a core aspect of Agenda 2030 and the Sustainable Development Goals (SDGs). Globally, 286 transboundary river basins cover 47.1% of the world's land surface, and nearly half of the world's population within a transboundary river or over a transboundary aquifer. Therefore, equitable and sustainable management of these extensively shared resources is important for ensuring global, national, and individual water security and environmental protection. The worldwide reliance on transboundary river basins means that they have major implications for global sustainable development. The Ganges-Brahmaputra-Meghna (GBM) is the most important transboundary basin in South Asia facing considerable challenges of large-scale river diversions, food and energy security, and international cooperation. Major dam construction in the Himalayas' upper catchments in India, Nepal, and Bhutan, with the related water diversion and barrage problems in the lower catchment locales, have engendered major water disputes. As a result, the Koshi River dispute between India and Nepal and the Tista and Farrakka Barrage disputes between India and Bangladesh can be exemplified as a failure of transboundary water governance in South Asia. Many small rivers have started drying up as a result, with the manifestation of the impending drought conditions during the summer months. A disruption in the navigability of these rivers due to the seasonally falling water levels in summer that paradoxically often precede frequent floods later on during the monsoon is quite apparent in different parts of South Asia. The present research developed a framework for managing water disasters and environmental sustainability using a machine learning model and geospatial application for the Ganges-Brahmaputra-Meghna River basin. At the same time, significant community resilience, creative improvisation, mutual aid, and social cohesion have been observed. However, the aim of achieving the SDGs goals in South Asia may not be possible without discussing and mitigating existing transboundary environmental problems and the local community responses to them. Due to the existing transboundary river basin issues within the Ganges-Brahmaputra-Meghna (GBM) river systems, south Asia has suffered the most. The present research adopted the United Nations' SDGs framework to help governments and stakeholders tackle such challenges and inform policy intervention in individual sectors, there is a need to consider inter-connections and delve more deeply into processes and outcomes.

Keywords: Transboundary River basins, Ganges-Brahmaputra-Meghna (GBM), water disaster, GIS, environmental sustainability

Effectiveness of Integrated water Resource Management (IWRM) with Nature based solution for the sustainable Meghna River basin management

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Abstract

The Meghna River is a significant transboundary river of Ganges-Brahmaputra and Meghna (GBM) basin that flows through Bangladesh and India, serving as a lifeline for millions of people in the region. Originating in the hills of eastern India, the Meghna River traverses' diverse landscapes, including forests, wetlands, and agricultural plains, before draining into the Bay of Bengal. The river plays a crucial role in supporting livelihoods, agriculture, fisheries, and transportation for communities along its banks. As a transboundary river, the Meghna River basin faces challenges such as water scarcity, pollution, erosion, and flooding, necessitating collaborative water management efforts between Bangladesh and India to ensure sustainable development and ecosystem conservation in the region.

This study would explore the effectiveness of integrating Integrated Water Resource Management (IWRM) with nature-based solutions for sustainable Meghna River basin management. IWRM takes a holistic approach to water management, considering social, economic, and environmental aspects, while nature-based solutions leverage the power of natural ecosystems to address water-related challenges. By combining these approaches, stakeholders can enhance the resilience of the Meghna River basin ecosystem, improve water quality, mitigate flood risks, and promote community engagement. Collaboration between Bangladesh and India is essential for implementing integrated water resource management with nature-based solutions to ensure the sustainable development and conservation of the transboundary Meghna River basin.

Keyword: Integrated water resources management, nature-based solution, sustainable management, restoration, water quality, resilience, water-related challenges, community engagement.

Sustainable Water Resources Management in Brahmaputra River Basin: Key Challenges and Way Forward

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Abstract

The Brahmaputra River, flowing through China, India, and Bangladesh, sustains diverse ecosystems, millions of livelihoods, and regional economies that presents a critical case study for examining the challenges and opportunities in sustainable water resources management. This paper aims to identify the key challenges of the basin and propose strategies for a sustainable future. The objectives of the study are to analyse the transboundary issues, assess the impacts of climate change, evaluate ecological degradation, assess the rising tension due to hydro-electric power projects, examine water governance mechanisms, and finding out plausible measures. Methodologically, a comprehensive review of existing literature, policy documents, and reports is conducted to synthesize knowledge on the subject. In conclusion, the paper indicates that addressing the complex challenges of sustainable water resources management in the Brahmaputra River Basin requires a multidimensional approach that integrates environmental, social, diplomatic and economic considerations. The findings of the paper reveal that transboundary cooperation is essential for equitable water sharing and effective flood management. This paper also depicts the inevitability of a Joint River Basin Organization for sustainable water management in the region. By fostering transboundary cooperation, strengthening diplomatic efforts, enhancing climate resilience, strengthening governance mechanisms, and promoting inclusive development, stakeholders can pave the way for a more sustainable and resilient future for the basin and its inhabitants.

Keywords: Sustainable water resources management, Brahmaputra, climate change

Trans-boundary water dispute between Bangladesh and India and the role of Bangladesh National River Conservation Commission (NRCC): Prospects and Challenges

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Abstract

Rivers are the lifeline of civilizations and are also at the centre of trans-boundary water dispute across the world. Bangladesh, being in the geographically crucial Brahmaputra- Ganga- Padma delta, shares fifty-four rivers with India out of its 230 major rivers and is consistently struggling to ensure equitable water access for its ecosystem during the dry monsoons since independence. The creation of the Joint River Commission (JRC) in 1972 and the Ganga Water Sharing Treaty in 1996 are inter alia mentionable measures reached upon by both the countries till now. With the emergence of ‘right of nature’ movement across the world such as Ecuador, Panama, Bolivia, Australia, New Zealand, India and Bangladesh; time has come to assess the potentiality of horizontal accountable institution like Bangladesh National River Conservation Commission (NRCC) in settling the trans-boundary water dispute between Bangladesh and India. By invoking ‘public trust doctrine’ Bangladesh launched NRCC in 2013 which necessitates all out actions to protect and bring back river ecosystem of the country as soon as possible. Hence, this paper by employing qualitative method of study will explore the underlying prospects and challenges embedded within existing governance paradigm especially in the vertical implication of trans-boundary water-sharing disputes with India. The paper will particularly assess the legal framework of Bangladesh-India trans-boundary water dispute and NRCC simultaneously to analyse possible implications of the framework within the realm of neo-global environmental movement called ‘right of nature’. The conceptual framework of international regime on this will also be consulted to sketch out viable policy interventions to settle such historical crisis between Bangladesh and India.

Keywords: Trans-boundary River, water dispute, NRCC, Bangladesh, India

Tying-up the Relation on a Drying River: Imperatives behind Tista Water Sharing between India and Bangladesh

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Abstract

The long-standing political negotiation process between India and Bangladesh over the Tista/Teesta water-sharing have failed to adequately address the pressing concerns of climate change and uncontrolled human activities, which pose serious threats to the current water scarcity in the basin. These issues have complicated the transboundary water-sharing situation beyond previous expectations. Therefore, the present study focused on understanding the history and politics behind the development of equitable Tista water-sharing proposal and its potential impact on river ecosystem services, assuming it is the only solution to resolve water conflict.

The proposed water-sharing arrangement heavily relies on past river flow conditions, yet these conditions have undergone remarkable changes due to shifting rainfall pattern, rising temperature, alterations in land use and land cover, and escalating water demands from surrounding cities and hydropower projects. As a result, the available water volume, especially during the non-monsoon lean season, falls short of meeting the irrigation needs of over 1.5 million hectares of agricultural land and the demands of more than 3500 MW of hydropower production across the basin. Moreover, the data secrecy maintained by both the nations is a double-edged sword. If one country shares the data, the other will distrust/protest it due to drastic reduction of water or massive increase in demand-supply ratio. Again, if the data is not shared, as is currently the case, it may increase mistrust and escalations of conflict. It is imperative for both nations to recognize that climate-induced risks, rapid population growth, and development-driven water demand across borders cannot be adequately addressed solely through equitable water-sharing agreements. This study underscores the critical issues surrounding Tista water-sharing through three main sections: concerns pertaining to water allocation, challenges related to water availability for equitable water-sharing, and the intricate complexities stemming from the intersection of these two issues.

Keywords: Transboundary River, water-sharing, politics, water conflict, and data secrecy

Flood Susceptibility Analysis Using Multi-Criteria Evaluation (MCE) Technique for Land Use Planning: A Case from Saptakoshi transboundary River, Nepal

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Abstract

Flooding is one of the main natural disasters basically during the rainy season in Nepal and has been the most frequent, highly damaging and widespread natural hazard. It is estimated that more than 6,000 rivers and rivulets are in Nepal flowing from north to south. Several cases of flood disaster were recorded in Melamchi Municipality (e.g. June 2021, August 2021). Substantial downpour has triggered floods and caused extreme loss floods in the Melamchi Municipality. Therefore, the Melamchi Municipality which is urban area, has been considered as the study area with coverage of 160.63 sq. km in the Sindhupalchowk District of Bagmati Province, Nepal, and is subject to heavy rainfall during the months of June to August, with an average annual rainfall of 1728 mm.

The aims of this study are firstly to determine the factors contributing to the flood occurrences, secondly to analyse the Flood Susceptibility Level (FSL) and thirdly to produce the flood hazard map for the study area and suggest for risk sensitive land use planning. In this study, eleven (11) parameters were considered in relation to the causative factors to flooding, which are: precipitation, slope gradient, elevation, drainage density, stream power Index (SPI), Topographic Ruggedness Index (TRI), Topographic wetness Index (TWI), Geology, land use land cover, soil textures, and SAVI. This study is conducted based on the desk study by using geospatial approaches. To develop the flood susceptibility map that shows area's potential for flooding, secondary data such as satellite imagery and survey data (secondary source) were analyzed. FSL was defined using Analytical Hierarchy Process (AHP), a Multi Criteria Evaluation (MCE) technique integrated with GIS software. The criteria used in the AHP analysis were identified through a comprehensive literature review. The AHP is adopted because it assigns relative priorities to each criterion in achieving a particular objective and uses a hierarchical structure of criteria and sub-criteria, aiding in finding the most important components.

Keywords: Flood susceptibility, multi-criteria evaluation, *Analytical Hierarchy Process*, Nepal

THEME 1

**ENVIRONMENTAL HISTORY, WATER-
ENERGY-FOOD NEXUS IN SOUTH ASIAN
TRANSBOUNDARY RIVER**

Looking back to look forward: envisioning a transdisciplinary future for the river islands of Ganga

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Abstract

This presentation with focus on quotidian scenes from river islands of the Lower Ganga Basin, unleashing problems and possibilities that dot the “muddyscape” of Bengal – a least explored theme in both river studies and island scholarships – and with some efforts to assemble the river island narratives during the very recent times. Using historical political ecology and hydro (sediment) social approaches, and with empirical accounts from river islands of selected districts of Bengal, this presentation will methodologically address why integrating history, geomorphology, sciences on ecosystem services, anthropology, and cultural studies and investigating their interstices is imperative. The second part of the presentation will focus on first-hand narratives from some transboundary projects (such as IUCN-funded Ecosystems for Life (E4L) and SOR4D ENGAGE), laying out the need to further consolidate and activate these initiatives, towards more “just” and meaningful transdisciplinary actions, forging transboundary regional cooperation on socio-ecological sustainability.

Keywords: River studies, island scholarships, political ecology, Lower Ganga Basin

Colonial Land Regime, Political Economy and Nature's Serendipity: Hydro-ecology in the Bay of Bengal, Bengal Delta Rim

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Abstract

The concept of economic waste emerged as a discourse with the passing of Permanent Settlement Act by the British Indian Government in 1793. This Act classified land as waste and productive. The vast delta swamps of the Bengal presidency were soon surveyed and classified as wasteland under various nomenclatures such as mangrove, jungle, uncultivated land and swamps to be reclaimed through settled agriculture. The colonial officials measured the land that was separated from water bodies that had sustained Bengal's hydro-ecology for millennia. This separation of water from the surrounding landscape was at the heart of the colonial empire building project. For example, the expansion of Calcutta as Presidency port towns developed at the cost of its local hydro-ecology- mangroves, swamps, ponds, backwaters and creeks that were reclaimed from the sea to develop the urban landscape. The emphasis on revenue settlements resulted in severe appropriation of labour in the form of share croppers and tenants who worked on land leased by colonial intermediaries - the Zamindars of Bengal. The paper will evaluate the colonial imagination of littoral Bengals resource frontier as land-based, revenue reserve, and paddy frontier. By focusing on connected ecological waterscape and cultural milieu shaped by amorphous interplay of land and water bio-networks I argue that the acquisition of part land part water - 'wasteland' was a catastrophic hydro social change triggered by the colonial state and modernist jurisprudence. This will help us understand how current environmental predicaments in the greater Bay of Bengal region (present day Bangladesh, West Bengal and eastern part of India) are connected to colonial strategies of settling the landscape through the separation of land from water.

Keywords: Hydro-ecology; Political Economy; Colonial Land Regime, Ecological waterscape; Bengal-delta

The Dynamics of Bangladesh-India Bordering Rivers: Challenges and Policy Response

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Abstract

A total of fifty-four rivers of Bangladesh, including the principal ones flow in from India, i.e. they either originate in India and/or flow within India before entering Bangladesh. Bangladesh is thus the lower riparian for all these rivers. And, several rivers like Ichamati and Muhuri marked the boundary line between Bangladesh and India, which often runs through ecologically vulnerable agrarian areas. Some of the rivers traverse across the borderline. However, the rivers along the Bangladesh-India border often with multiple branches and crisscross movement have turned this border into a complex and volatile one. These unpredictable bordering rivers very often, by altering their directions or by corroding land on one side and forming new land masses on the other, create territories under adverse possession, which invites disputes over territories. The Muhuri River, for instance, has created a tiny char (sandy tracts of land, often created by river erosion) in the Belonia sector, which has been the bone of contention between Bangladesh and India for so many years. So, the main dynamics as well as challenges in the riverine border between Bangladesh and India remain with the frequent changes of direction of the bordering rivers and their erosion and inundation. By nature, the bordering rivers in this deltaic region are of convergence. Therefore, a basin-based and community-based combined approach to the management of the bordering rivers is warranted. But the border management policies of these two countries particularly of India have been overwhelmingly divergent and militarized. It is to be noted that the police border may ensure 'freedom from fear', but sustainable security could be achieved by ensuring 'freedom from want'. It is perceptible that the ecological and economic integration of the borderland people would automatically change the matrix of security concerns. Under these circumstances, this paper will focus on the challenges of Bangladesh-India bordering rivers and the policy response.

Keywords: Bordering Rivers, river erosion, Policy Response, Bangladesh, India

Transboundary Rivers of South Asia: Interplay between Dispute and Diplomatic Deadlock under Climate Change Conditions

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Abstract

This study will explore the factors contributing to the lack of progress in river resource diplomacy among the four principal co-riparian states of South Asia (India–Pakistan to the west; India–Bangladesh–Nepal to the east). It argues that the difficulties result from three persistent realities that define these states: first, the presence of fundamental disparities in the endowments of natural river resources among them; second, the pressure on each government to prioritize the river resource needs of its own country; and third, their unwavering commitment to diplomatic approaches that are largely incompatible. In addition, it asserts that a significant shift in the way the region's river resources are conceptualized and managed is unlikely to result in a resolution to the situation. This would entail that these states forgo their presently predominantly unilateralistic tendencies and adopt bilateral or even multilateral strategies that are considerably more transboundary, integrated, or "river basin" oriented. The findings indicate that future water negotiations in the basins will become increasingly complex, primarily due to the widening disparity between water demand and availability. The negative effects of climate change will worsen the situation. In addition, the dynamic nature of India's domestic politics and the escalating internal strife among its provincial states will undermine the authority of the Indian central government to effectively coordinate the management of transboundary water resources. The study suggests that the persistent accumulation of unresolved river resource conflicts among the aforementioned states—India and Pakistan, India and Nepal, and India and Bangladesh—will inevitably interfere with the progress of logical river resource development in the area, exacerbate the animosity that is already evident in their bilateral relations, and severely limit aspirations for greater regional collaboration.

Keywords: Transboundary River, Climate Change, Dispute, South Asia

International Borders and Charland: Understanding Vulnerable Communities in Bengal's Borderlands

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Abstract

This study delves into the intricate dynamics between the international border and the vulnerability of residents in the Charlands of Murshidabad, West Bengal. Charlands, formed through river bank erosion, serve as habitats for marginalized communities, yet are prone to hydro-morphological changes and monsoon disasters. The proximity of these areas to international borders complicates the lives of inhabitants, as strict surveillance by BSF affects access to governmental facilities and mainland transportation. Through academic inquiry, this research aims to comprehensively analyze how the presence of border security forces exacerbates the vulnerability of Charland residents. Furthermore, the imposition of strict border control measures, including fencing, surveillance, and checkpoints, can disrupt the daily lives and livelihoods of residents of charland. Restrictions on movement, increased scrutiny, and the militarization of border areas can create a sense of alienation and marginalization among local populations. Constant surveillance creates stress, anxiety, and insecurity among the inhabitants in addition to limitations on livelihood opportunities and economic development. In some charlands, villagers are forced to leave chars which are located beyond the BOP due to border security measures and environmental risks. The study focuses on remote Charland areas situated along the banks of the Padma River beside the Indo-Bangladesh border in the Murshidabad district of West Bengal, India. In the Murshidabad district, there are many major Charlands such as Pirojpur, Bajitpur, and Narukhaki Chars in Raghunathganj-II block, Dakshini Nayakharida Babupur, Paraspur, and Forajipara under Udaynagar Colony in Ghosh Para Gram Panchayat, in the Jalangi block. These Charlands are located along the eastern side of the Murshidabad district and share a long international boundary with the Rajshahi division of Bangladesh. The study employs a mixed-methods approach, incorporating Remote Sensing analysis, group discussions, and interviews to comprehensively explore vulnerability in Charlands. Remote sensing data are utilized to reveal spatio-temporal changes in Charland extension, emphasizing the dynamic nature of the landforms over time. Field surveys and interviews are conducted to obtain a grounded understanding of the lived experiences of Char dwellers, shedding light on the challenges they face in sustaining their livelihoods amidst environmental and politico-economic pressures. This integrated methodology allowed for a multifaceted examination of vulnerability in Charlands, combining quantitative analysis with qualitative insights from local perspectives.

Keywords: Charland, mainland transportation, Vulnerable Communities, Murshidabad

THEME 2

**TRANSBOUNDARY WATER
GOVERNANCE AND CLIMATE
RESILIENCE**

Transboundary River Governance in Bangladesh and India: Balancing Environmental Protection and Rights to Water

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Abstract

Transboundary rivers sharing between Bangladesh and India have a troubled past and a worrying future. The number of transboundary rivers between Bangladesh and India is 54, of which only the Ganga River has a water-sharing agreement signed on 12th December 1996. According to this agreement water will be distributed between the two countries based on the measurement of water flowing in Farakka from 31st January to 31st May every year. The 30-year agreement will be renewed subject to the consent of both countries. Bangladesh is continuously trying to agree on the water sharing of transboundary rivers including Teesta, but the reality is that no agreement so far has prevented India's unilateral water withdrawal. In March 2010, the two countries reached a consensus on the Teesta water-sharing agreement in Delhi but failed. Previously, the Bangladesh-India Joint Rivers Commission Statute was signed on November 24, 1972, for the mutual benefit of the people of both countries. Presently, river sharing between the countries is like a Zero-sum game and both countries have failed to determine actual demand. Although both countries are trying to divide the river flow but failed to address the key issues relating to transboundary water sharing. The issues are mainly related to national development, national security concerns, and maintaining ecological balance as well. The paper aims to investigate the governing mechanisms of the transboundary river management between Bangladesh and India, after outlining the main points of tensions and discussing existing legal frameworks, the paper examines the practical issues of water sharing. This paper identifies two securitized dimensions such as environmental protection and equal rights to water for both countries. This submission then discusses the consequences of regional cooperation and related cooperative mechanisms. Finally, the paper highlights how Bangladesh and India could facilitate bilateral cooperation in water sharing with better policy. The scope of this research is restricted to the study of International Environmental law and state practice of Bangladesh and India.

Keywords: Transboundary River, Governance, Environmental Protection

Environmental Justice Movements in Bangladesh: A Comparative Analysis of the Farakka Long March and the Tipaimukh Dam Resistance

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Abstract

This paper aims to explore and compare two significant protest movements in Bangladesh against the Farakka Barrage and the Tipaimukh Dam. In May 1976, a large long march led by Maulana Abdul Hamid Khan Bhashani protested against barrage construction, marking a major environmental protest in South Asia. Decades later, protests erupted against the Tipaimukh Dam project, sparking widespread discontent in Bangladesh and beyond. Through this paper, I seek to examine the nature, consequences, and outcomes of these two protest movements. In this paper, I aim to investigate several questions: What is the significance of such protests in the context of Bangladesh? What are the similarities and differences between these two protests? What lessons can we learn from such protests? Moreover, I am interested in examining the strengths and weaknesses of organizing such protests in the context of Bangladesh politics.

Keywords: Environmental Justice, Dam Resistance, Farakka Long March, Tipaimukh

Examining Legal Frameworks for Sustainable Transboundary Water Governance amidst Climate Change between India-Bangladesh

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Abstract

Transboundary water governance is a complex issue that presents legal, political, and environmental challenges, particularly considering the increasing impact of climate change. The Indo-Bangladesh relationship offers a vital perspective to understand these challenges, given their shared reliance on transboundary rivers such as the Ganges, Brahmaputra, and Teesta. These rivers are crucial for the livelihoods of millions of people and reinforce economic development in both countries. However, climate change-induced phenomena like unpredictable rainfall patterns, glacial melting, droughts, and floods worsen tensions over water allocation, quality, and infrastructure development. Managing transboundary water resources is inherently complicated, and climate change further complicates it. This paper focuses on the India-Bangladesh relationship, where various rivers that are essential for both nations are strained by climate-induced shifts in rainfall, glacial melt, and extreme weather events. Moreover, the study will explore possible solutions to enhance transboundary water governance in the region. This study employs a qualitative approach, analyzing existing literature, including legal documents, official reports, peer-reviewed articles, and relevant publications. Additionally, the research might incorporate case studies of successful transboundary water management initiatives in other regions for comparative analysis. The results of the study are expected to reveal the strengths and weaknesses of the current legal frameworks governing transboundary water resources between India and Bangladesh, particularly regarding climate change adaptation. It also aims to identify potential loopholes and limitations that hinder effective water management in the face of climate uncertainties. The rationale behind this study is that the increasing water insecurity driven by climate change requires a comprehensive understanding of the current legal frameworks and the need for potential revisions. This study holds immense value for policymakers, water management authorities, and scholars, as it provides insights into strengthening transboundary water governance in the region. By identifying the shortcomings and suggesting solutions, this research significantly contributes to building a more robust legal framework for transboundary water management between India and Bangladesh. This, in turn, can ensure equitable and sustainable water resource utilization for both nations, fostering regional cooperation and resilience in the face of climate change.

Keywords: Transboundary Water Governance, India, Bangladesh, Climate Change, Water Treaties, International Water Law

Effective Indo-Bhutan Transboundary Water Governance: Quest for Disaster Risk Reduction and Inclusive Resilience among Local Communities

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Abstract

More than fifty rivers, originating from the northern glaciers of Bhutan, flow south to the Brahmaputra River basin in Assam. The Brahmaputra River basin is shared between four countries: China, India, Bangladesh, and Bhutan, making it one of the most unique and crucial river basins in the world. In recent times, due to climate change, most rivers have dramatically changed their behavior with long spells of dryness, irregular and shallow flow, deposition of silt, excessive sand, and sediments, impacting the traditional livelihood patterns on both sides. The irregular and flash floods particularly affect the local communities of Assam, with problems of river bank erosion, flooding, and destruction of agriculture. The inhabitants of the Indo-Bhutan border are among the poorest of the region, and downstream communities in Assam have already been crippled by issues of ethnic conflict, armed conflict, and internal displacement since the mid-1990s. In such a situation, unemployment, loss of traditional livelihood, and mass exodus have complicated internal ethnic dynamics and citizenship issues in Assam, where sudden and huge internal migration is often looked suspiciously at by both the state and dominant civil society organizations. Especially big rivers like Manas (Drangme Chhu in Bhutan) and Beki (Kurusu river in Bhutan) have caused significant damage to downstream communities in Assam during monsoons where traditional flood resilience techniques fail. In this backdrop, this paper interrogates the possibility of building effective trans-boundary Indo-Bhutan water governance. By looking beyond Indo-Bhutan regional cooperation only in terms of the political economy of hydropower projects, the paper aims to explore the possibility of involving local people in river management. Based on existing and emerging forms of river governance on both sides, the paper focuses on strengthening community-centric resistance to floods and disaster risk reduction with the intervention of both state actors.

Keywords: Water Governance, Indo-Bhutan transboundary river, inclusive resilience

Transboundary River Friendship: A case of Atrai (Atryee) River in Bengal Delta

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Abstract

India & Bangladesh are the two neighbourhood countries since 1971. They have plenty of resources in common and most of all they are sharing river water through transboundary or common rivers. But after sharing dispute took the important role in their relations. Hydro diplomacy is one of the most important factors in their relationship. It brings distrust among them. So many transboundary rivers of north Bengal are also facing water sharing disputes. Atryee is one of them. Atryee is a transboundary river flowing between India & Bangladesh. But rubber dam at Dinajpur (Bangladesh) issue brings the India - Bangladesh relation once again in the front row. Though since 2018 a community led approach in Atryee trying to tie the knot with Bangladeshi people called Transboundary River friendship, an important initiative started. Hope this approach can be essential economic development & peace building.

Keywords: Transboundary River, hydro diplomacy, water sharing, economic development, peace building

THEME 3

**RIVER EROSION, HEALTH ECOLOGY OF
TRANSBOUNDARY RIVERS**

Riverbank erosion in the Bengal Delta: Process, vulnerability and management approach

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Abstract

Riverbank erosion is a fundamental fluvial, geo-mechanical and chemical process in a river basin. On the global scale, the severity of riverbank erosion is maximum for the Bengal Delta for its huge reservoir of population with intensive land use. The study aims to show the spatial and temporal variation of bank erosion along the major rivers of the world, especially the rivers of the Bengal Delta such as the Ganga, Brahmaputra, and Padma. Riverbank erosion is a natural geo-ecological process responsible for meandering and braiding which is examined in the context of frequent channel cutoff and the emergence of channel bars (mid and point) of the Bhagirathi-Hooghly and Padma-Meghna rivers. Moreover, bank erosion is essential in maintaining the balance of nature. The typology of bank erosion and its associated mechanisms are discussed with special reference to the factors of erodibility and erosivity. The massive sandy or mixed bank coupled with seasonality in the rainfall and tidal influxes induce the natural erosion process. Moreover, the altered hydrologic regime due to the construction of the Farakka Barrage Project (FBP) escalates bank erosion in West Bengal and Bangladesh. The changing land use and land cover, mushrooming of the brickfields, and other forms of human activities induce bank erosion. Economic vulnerabilities and livelihood crises are common in the wake of riverbank erosion. The economy of the Bengal Delta is still predominantly agro-based. Therefore, agricultural practice concentrated along the river banks due to fertile soil and availability of water is often disrupted by channel migration and bank erosion. The shock of bank erosion is first perceived by the land loss at different spatial scales from the national to village level. The field survey within the specific part of the Bengal Delta indicates the marginalization of the agrarian economy. As the land for cultivation is engulfed by the river, farmers face joblessness, a drastic fall in income, an increase in poverty level, and an overall decline in the standard of living. The people in transition (conversion from agro to non-agro) face an extreme level of marginalization and find it difficult to cope with the emerging situation. Besides, thousands of people often become homeless and bound to be environmental refugees in India and Bangladesh. Social pathology concerning bank erosion is investigated through deep roots and under current in destabilizing social bonds and family relations. Here, the social processes (group, intergroup, personal, and interpersonal) are examined to trace the changes in the social interaction and the behavioural pattern of the victims after riverbank erosion. The social psychology of hazards (distressed psychology) like fear, phobia, tension, and shocks related to the different phases of bank erosion (pre, during, and post) is examined. Moreover, the social transformation, mutation, and evolution arising out of the occupying

charlands are also discussed in depth using behavioural model in the context of India and Bangladesh. For example, social fusion and fission are the common parlances for the people residing on the two opposite banks to expose conflict, as well as cohesiveness regarding the command over a mid-channel bar. There are various coping strategies to absorb the shocks of bank erosion. The victims have adopted some indigenous measures at the community and individual levels. Besides, hard engineering measures like dyking, embankment, and levees along the river bank based on the principle of civil engineering mainly taken by the government are common in the Bengal Delta. However, the mighty and furious rivers such as the Padma, and Ganga often breach especially during the monsoon months and these ambitious projects become futile. Observing the limitations of the civil structural measures against bank erosion, bio and social engineering measures as alternative shock absorbing strategy is explored. Bio-engineering measures such as vetiver (*Chrysopogon zizanioides*) plantation or similar projects have some successes and limitations. Moreover, social engineering measures aim to the economic alteration from a land-based to a non-land-based economy. Thus, the study highlights the governance and regulation for the management of bank erosion and will also discuss the maintenance measures and responsibility for upkeep, especially from political approaches to resources and environmental decision-making.

Keywords: Erodibility; Erosivity; Farakka Barrage Project, Livelihood vulnerability; Social psychology; Civil engineering; Bio-engineering; Social engineering

Does River Erosion Affects Agricultural Productivity in Bangladesh?

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Abstract

In Bangladesh, the phenomenon of riverbank erosion significantly impacts agricultural productivity, a crucial concern given the nation's reliance on agriculture for livelihoods and food security. While previous studies have explored the environmental and socio-economic effects of erosion, there exists a gap in understanding the direct econometric relationship between riverbank erosion and agricultural productivity. This study aims to fill that gap by quantitatively assessing how erosion influences farming outputs, an essential step for devising more targeted mitigation strategies. The objective is to establish a clear, empirical link between the extent of riverbank erosion and its impact on crop yields, thereby underlining the importance of this issue in terms of national food security and economic stability. Employing an econometric methodology, the study utilizes panel data to analyze the variance in agricultural productivity across regions with differing erosion intensities. By applying regression analysis, it seeks to isolate the effect of riverbank erosion from other variables affecting crop production. This approach not only enhances our understanding of the direct impacts of erosion but also informs policy formulation aimed at resilience-building among agricultural communities and the broader agricultural economy in Bangladesh.

Keywords: Riverbank Erosion; Agricultural Productivity; Bangladesh Farming; Soil Loss; Crop Yields

**Morphological Change Analysis of a Transboundary River in Bangladesh and India:
From Gangotri Glacier to Padma River**

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Abstract

Rivers are considered as the lifeline of a country. Therefore, taking care of the rivers and effective monitoring is a must. Bangladesh is the most downstream country in the Ganges-Brahmaputra-Meghna River system which is vulnerable to be easily affected by any kind of transformation in upstream. There are 57 transboundary rivers that flow through Bangladesh, 54 from India and 3 from Myanmar. In this study, we will investigate the evolution of a major transboundary river ‘Padma’ of Bangladesh. Its upper reach is in the neighbouring country India; flows named as Ganges. We will emphasize both the lower and upper reach channel shifting to observe the morphological changes for last few decades. Further we will focus to the origin of this river; the Gangotri glacier of Himalaya to find the glacial changes for the same period of time. Afterwards, the morphological changes will be correlated with the glacial changes. To do so, Remote Sensing and GIS based approach will be considered and satellite imageries from 1972 to date will be utilized. Multispectral satellite imageries will be classified using supervised classification methods for visual representation of the river which can be valuable for better management and conservation of transboundary river water resources. We have already studied some part and hope to extend it as an ongoing study.

Keywords: Transboundary River, morphological, glacial change, remote sensing and GIS

Challenges of Decaying River Islands and Tourism Based Human-Environment Sustainability: A Case Study in Mousuni Island of Indian Sundarbans Region

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Abstract

Human-environment relationship study is highly significant today in the context of sustainable development of regions. Environmental sustainability in the transboundary river basins principally depends on nature of riverine environment and human-environment relationship. Mousuni island is one of the highly vulnerable Bay of Bengal confronting and Hooghly estuarine islands within Indian Sundarbans delta region. It is a part of Ganga River basin of South Asia. This case study in Mousuni island intends to assess the current scenario of the decaying coastal areas, present problems, potentials for development of eco-friendly tourism and various entrepreneurship for a sustainable human adaptation and in long run to understand the scope of tourism for human-environment sustainability under such a fragile environment of the Indian Sundarbans. Here, the Digital Shoreline Analysis System (DSAS) has been applied to analyze temporal changes of coastlines using different shoreline positions and also to predict the rate of change in future by analyzing historical records. The island is facing severe coastal erosion and loss of land due to several hydro-geomorphic reasons. Besides, cyclones and storm surges are observed frequently here. Tidal surges also induce coastal erosion and repeated breaching of the poor embankments which lead to flood and inundation, displacement of people and destruction of properties. These events have enforced the people of Mousuni island to become climate refugee. Through field survey it is observed that main occupations of inhabitants here are farming and fishing. Here, resource is limited but human population increases very sharply. A section of young people therefore moves to other states in India and nearby Kolkata practically for their jobs. Recently, after tourism flourished in this island many residents choose and also are dependent on tourism-based activities for their livelihood. On the vulnerable hydro-geomorphic and climatic background, development of planned and authorised eco-friendly tourism as an alternative through active engagement of local community is necessary in Mousuni island which may be more beneficial for the island's local economy and environment as well as well-being of the local people. The present unplanned camp tourism of Mousuni island should be promoted to planned eco-friendly rural tourism without hampering island's authenticity and unique social identity of humans for the purposes of conservation of nature, development of local economy and rural livelihoods of people, achievement of full cooperation and support of administration, and development of sustainable infrastructures. Scenic quality model using InVEST (Integrated Valuation of Ecosystem Services and Trade-offs) has been applied here to figure out mostly affected scenic beauty spots

in the tourist destination of Mousuni island. This study also has been carried out with the help of secondary and primary datasets through structured questionnaires for camp-owners, tourists and local people. Collected datasets have been analyzed through SWOT-AHP hybrid model and GIS techniques in order to assess the strengths, weaknesses, opportunities and threats regarding tourism of Mousuni island and provide ideas and strategies for sustainable future planning and management toward the development of sustainable tourism and entrepreneurships in this island ensuring active participation of local people for their well-being.

Keywords: Indian Sundarbans, Mousuni island, coastal erosion, sustainable tourism, human-environment relationship, environmental sustainability

**Livelihood of The Fisher Community of Meghna Riverbank Area in Chandpur Sadar,
Chandpur District, Bangladesh**

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Abstract

The fishermen in Bangladesh are one of the vulnerable marginal groups, and they are actually at a disadvantage. This project aims to investigate the socioeconomic trends of marginal fishing settlements along the Meghna River in Bangladesh's Chandpur district. With the help of semi-structured qualitative interviews (N = 12) with different sorts of fishermen, a field study was carried out at the Meghna River estuary in Chandpur District. The first-hand accounts reveals that the fisherman in the Meghna Riverbank area don't have a good sustainable livelihoods situation. The income of fishermen is decreasing day by day due to lack of fishes. The interviewees also reported that the social recognition of fishermen family is also gradually decline. It was found that the fishermen's living circumstances were extremely unhygienic. Sometimes, while fishing in the middle of the river, they get caught in a storm or cyclone which also make their profession vulnerable. They suffered financial losses at that time since their fishing equipment was ruined and they have had to rebuild their houses which flooded away by disaster. Fishermen are unable to pursue other careers due to their lack of education and abilities. During the hilsa campaign, the fishermen faced a financial crisis, and the support from the government was not enough. When fishing was prohibited, more than two-thirds of the fishermen had no other job to go to, and half of them did not take advantage of government incentives in a satisfactory manner. In order to support fishermen for sustainable fishery management, the government, Fisheries cooperatives, NGOs, and other pertinent groups must work together.

Keywords: Livelihood, fisher community, Chandpur district, Bangladesh

THEME 4

**ISSUES, CONFLICTS AND COOPERATION
OF TRANSBOUNDARY RIVER SYSTEMS**

Water Sharing Geopolitics between India and Bangladesh: Recent Trends

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Abstract

The water-sharing geopolitics between India and Bangladesh has long been a critical issue shaping bilateral relations and regional dynamics in South Asia. This research examines recent trends in water resource management, focusing on the complex interplay of political, environmental, and socio-economic factors impacting transboundary water governance. Through a comprehensive analysis of key agreements, disputes, and hydrological data, this study sheds light on the evolving dynamics of water cooperation and conflict between the two riparian nations. This research has been conducted using a mixed-method approach. Drawing on an extensive review of scholarly literature, policy documents, and media sources, the research explores the historical context of water sharing arrangements, highlighting their significance in addressing challenges such as flooding, irrigation, and hydroelectric power generation. It examines the role of institutions, including the Joint Rivers Commission (JRC) and the Indo-Bangladesh Joint Rivers Commission (IBJRC), in facilitating dialogue and cooperation on transboundary water management. Furthermore, the research investigates the implications of climate change and hydrological variability on water availability and quality, considering their impact on agricultural productivity, food security, and livelihoods in both countries. It assesses the effectiveness of existing mechanisms for conflict resolution and cooperation, identifying opportunities for enhancing resilience and adaptive capacity in the face of emerging water-related challenges. By synthesizing empirical evidence and policy analysis, this research contributes to a deeper understanding of the geopolitical dynamics surrounding water resources in South Asia. It provides valuable insights for policymakers, researchers, and practitioners seeking to promote sustainable water management practices and foster cooperative relationships between India and Bangladesh amidst evolving regional and global pressures.

Keywords: Water-sharing, geopolitics, water resource management, Bangladesh, India

The Problem over the Management of Transboundary Waters and the Way Outs: A Case of India and Bangladesh

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Abstract

History is replete with examples of violent conflicts over water. The hydrographical basins which are linked to the greater use of water for power production and related to the greater speed of economic nationalism have an emphasized importance since the beginning of the 20th century. The experts describe the hydrographical circumstances as a key factor in 'both national and international politics as a binding link and dividing line in human destiny'. This is evident that the competition for both quality and quantity of shared water at a regional level often leads to international water conflicts. Political scientists, environmental historians, economists, environmentalists, and hydrologists started to pinpoint the danger of world water scarcity and its possible degeneration into water conflicts. The management of transboundary waters is a big modern problem that originated from the fact that the conception of territory changed with the emergence of nation-states and this aspect has had a considerable impact on this. The rapid economic developments of modern times have created a new group of problems of increasing importance arising out of the diversion of water and other artificial interferences with the natural course of streams. In many cases, those interferences have given rise to a serious crisis of state interests. India- Bangladesh water sharing dispute is a crisis between the two countries is an issue of this category which took birth immediately after the partition of India. Focusing on the above-mentioned arguments the present paper thus tries to analyse the dispute between India and Bangladesh over sharing the Ganges River waters in particular. The nationalist metaphors of the problem in both countries and how the politics of Ganges water resources has been one of the national strategies of power in India and Bangladesh will be elaborated. It then sets forth some explanations and reflections that arise from these cases, including the complex interaction between water issues and political relations: the twin dangers of big-country insensitivity or arrogance and small-country pathology; the need to guard against a doctrinaire approach to the question of bilateralism' versus regionalism; and the importance of not equating inter-country cooperation exclusively with a few large projects. The study also defines and examines water nationalism and water politics as a critique of the development process within which they are located in Bangladesh and India.

Keywords: History, conflicts over water, management of transboundary, Bangladesh, India

Locating Rights Based Approach (RBA) to the Transboundary Rivers in South Asia from Legal Personality Perspective of Rivers for ensuring Environmental Sustainability

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Abstract

The phrasings ‘legal entity’; ‘living rights’ of transboundary rivers have already succumbed the diaspora of major judicial authorities around the world. Specifically, the higher judiciaries of both Bangladesh and India have set the already established principles of rights of rivers throughout the globe from broader and grandiose perspectives. The discourses in the judicial dicta regarding the above principles are endorsed with futuristic approach on how counter-reprimanded effects of climate changes arising out of hegemonistic water management can be mitigated by strong judicial consensus between the states in South Asia specially in Bangladesh and India. Inter-state integrated parliamentary interventions for locating common legal policies and provisions on rights of transboundary rivers are significant to have natural flows of river as human right to life and rights of nature. Seemingly, both Bangladesh and India are marching towards finding cogent and sustainable manifesto for commensuration with the judicial directives on rights of protection of rivers from rights perspectives though slowly but consciously. The correlations among the rights of people living in the riverbeds and the rivers flowing towards the bays or oceans are also explored for ensuring sustainable climate resilience mechanisms. Most of the researchers espouse suspicion that in exchange of giving right to rivers of legal entity or personality as human beings; the consequences upon the destitute people along the riverbeds are skipped or intentionally neglected. The higher judiciaries both in India and Bangladesh have shown state responsibilities in their own jurisdictions in their judgments. The views are explicable to the protections of rights of rivers through state mechanisms along with containing people associated river bed grabbing, erosion due to sand collection, diversion of water destroying natural courses of water violating international watercourses treaties and conventions. But time has come upon the international water law bodies to take initiatives to intermingle in the mandate set by the judiciaries of both the states. Following the above mechanisms, this paper further examines the prospects of synchronizing the principles of rights-based approach (RBA) to the underlying theoretical underpinning of rights of rivers. A number of academia have meticulously shown difficulties in the contours of ‘loco parentis’. The views on ‘custodianship’ or ‘guardianship’ of river basins in the juridical senses are not envisioned as emphatic as they should be to help the theory of rights of nature reach a place of consensus and unanimity. The linkage of RBA and rivers’ rights has to be seen as a starting point in dealings of transboundary river management and governance among common rivers in India and Bangladesh. In the formation of body politic, the international forum should be framed among federal states, central Indian government and Bangladesh. The present authority in bilateral vogue is not significant in terms of entailing variances in

heterogeneous interests of the citizens, divergent political understanding among provinces and states. The differences in the ideology of power in maintaining water diplomacy should be sacrificed for the sake of common ecological and economic advancement. Because, the environmental deterioration due to climate change cannot be mitigated by mere economic power or military power. State power can be utilized to slow down the pace of destruction but there is no way to avoid the ultimate unexpected consequences in the river water world. The future needs more augmentation and arguments in the theories for encapsulating common rights of rivers, people around the rivers, the states at large.

Keywords: Rights based approach, transboundary rivers, south Asia, environmental sustainability

4Rivers of Resistance: Maulana Bhasani's Environmental Legacy

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Abstract

Maulana Bhasani's long political career has several important chapters. His fight for the lower caste Hindus and Bengali Muslims of Assam is undoubtedly comparable to South Africa's Nelson Mandela. Bhasani must have been the chief architect of the foundation of the freedom movement in East Bengal. He was the undisputed leader among the peasant labourers. Idol to young society. However, I would say that the fight against the big dam in the last lagna of his life was the most important. Maulana Bhasani's philosophy has recently started to be practiced in different countries of the world. In the Indian subcontinent, Bhasani pioneered the voice against the construction of modern large dams. Next to his huge political activities, the role of dam opposition and environmental movement became somewhat secondary. But he is not a mere majlum or red Maulana Bhasani. Pani Maulana was. Throughout his life he was vocal for the people of Nadisikasti. The reservoir of his political thoughts was the countless rivers of Bangladesh. He used to decide political strategy while taking the boat along the river. Nature and Bhasani were complementary to each other. When the people of the fishing community could not find fish somewhere, if they remembered Bhasani Huzur, he would tell them which side of the water they cast their nets to find fish. Once he was going to a rally with a boat. Sunny sky. A gentle breeze is blowing. Bhasani stopped to board the boat and said to the sailor that the storm is coming in half an hour. wait Don't leave the boat now. Majhi was a little surprised and obligingly accepted Bhasani's words. Strange incident, within half an hour the sky really darkened and rain came. In fact, Maulana Bhasani could tell where there are fish or when a storm is coming due to his close connection with Prakti. It was this foresight that helped Bhasani Huzoor question the construction of the Farakka Dam. He knew that this dam would be the cause of loss to the people of hundreds of villages in West Bengal adjacent to Farakka, not to mention Bangladesh. Incidentally, forty-six and forty-seven years after the construction of the dam, Maulana Bhasani's words have been matched word for word. I myself visited different villages near Farakka in both countries and saw how the local people were affected. Bigha farming land has been destroyed after Bigha. Many people from the fishermen community have been ousted. Maulana Bhasani was ill at that time. old man His age is around ninety-six years. In 1976, Bhasani called for a historic long march to protest the construction of the Farakka Dam. Maulana probably got the inspiration for this peaceful march from his close friend, China's legendary leader Mao Zedong. Bhasani's Long March, like Mao's Long March, was immense in scope and importance. The 115 km or 64-mile-long journey from Rajshahi city to Farakka in India was a novel one. Bhasani's age, as I said earlier, was over

ninety. Then seriously ill. Even he came to the meeting place in Rajshahi on the appointed day and made the gathered lakhs of people aware about the danger of the big dam. Then his body is burning with fever. Before the procession started, it started raining in torrents. However, under the inspiration of Nachorbanda Bhasani Huzur, the historic long march continued towards Farakka. Maulana Bhasani's march brought the Farakka question to international attention. Bhasani wrote to the then Prime Minister of India Mrs. Indira Gandhi to consider the matter. Mrs. Gandhi said that the scientists and technologists of her country told her that there would be no problem between the two countries even if the dam were built. Cusec water will be distributed properly. What Maulana Bhasani said in response to that letter is instructive for environmental activists. He said, "My dear Indira, even if we accept the elites of your country, the citizens of both the countries will get the cusec water equally." There is still the question whether technocrats or scientists have measured how much water an aquatic animal, fish or snake frog needs to sustain life! If there is a big dam, how much their lives will be disrupted! Maulana Bhasani spoke about modern ecology or ecosystem at that time. I can't think of any other political leader in the Indian subcontinent who has been so vocal and compassionate about the environment.

Keywords: River's resistance, environmental legacy, maulana Bhasani

Critical Analysis of Transboundary Rivers' Co-operation: In the context of Business and Human rights in Bangladesh

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Abstract

Bangladesh is jewelled with rivers surrounding it. Being a riverine country, the root of its people is connected to rivers, whether economic or overall existence. Lamentably, the rivers, which are indispensable to our survival, are already facing imminent menace to our existence. Despite legal acknowledgment, all the rivers of the country are now living beings declared by the apex court of Bangladesh, though the practical scenario is quite disappointing. Bangladesh has fifty-seven transboundary rivers. Due to the negative impact on the upper riparian stream, Bangladesh is also facing adverse consequences due to its geographical construction. Unplanned growth of industrial and other infrastructure developments has been proven as a bar to achieve sustainable development in that region, particularly seen in the transboundary connected water system. Industrial and infrastructure projects, for example - sand mining and poor waste management systems, have adverse effects on the livelihood of not only riverine people but also the species and the ocean itself. Without responsible business conduct, the aim of awarding the river as a legal person will not be fully achieved. In this context, the paper aims to analyze the bridge between business and human rights with transboundary water governance practice in focus on corporate liability by ecocide laws. The paper on the one hand explains the loopholes in both national and international legal frameworks and on the other hand puts a question mark on inadequate political will to achieve transboundary rivers' cooperation.

Keywords: Transboundary Rivers, human rights, business, Bangladesh

THEME 5

**DROUGHT AND FLOODS IN
TRANSBOUNDARY RIVER BASINS**

**Local knowledge, experiences and practices in Brahmaputra Jamuna River basin:
Community responses to disasters in a changing environment**

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Abstract

Community responses to environmental disasters is an emerging issue both in disaster and climate change studies, particularly exploring disaster risk management (DRM) – climate change adaptation (CCA) mainstreaming and integration at local level. Existing coping strategies to natural hazards during normal periods and in disasters, influenced by community vulnerabilities and resilience, may indicate how the concerned individual household or collective community will adapt to predicted future climate threats. Scientific knowledge of future climate change and its predicted impacts on human and ecological systems is helpful but hardly feasible for effective adaptation at local level. Thus, the understanding of local level climate change impacts and community adaptation to these risks is a critical issue in recent climate change studies, particularly in the developing world. Local knowledge and experience can assist in enhancing adaptive capacity and community resilience. It is therefore important to explore how local knowledge, experiences and practices (LKEPs) can help communities in building a higher level of adaptive capacity to cope with environmental disasters in a changing environment. This study attempts to answer the question: how are communities in a transboundary river basin (TRB) coping with environmental disasters in the context of climate change? The discussion of this question comprises three main objectives: (i) to examine LKEPs associated with community coping mechanisms to hazards; (ii) to explore emergency responses to disasters, particularly as pursued by individual households; and (iii) to understand the potentialities and constraints of these coping mechanisms in their effectiveness in reducing the risks of present climate variability and future climate change. This study shows that LKEPs that help communities living on the Char lands of a TRB with responding to environmental disasters and accelerate their capacities to adapt to future climate risks. The historically developed traditional knowledge and practices in Brahmaputra-Jamuna River basin helped the Char-dwellers to adapt to seasonal climate variability and cope with the abnormalities of localised environmental disasters such as severe floods and river bank erosion. The Char-dwellers follow three coping and adaptation strategies from a livelihood perspective: cropping pattern, livelihood diversification and seasonal migration. The Char-dwellers also have many gender-specific strategies and mechanisms for coping with disasters, particularly severe floods. They change their strategies time-to-time according to crisis severity and their access to local resources and institutions. Some of their strategies are not taken in their own interests but for wider socio-economic and political influence. For example, selling labour in advance during flood periods is not always on a voluntary basis. Many people look for work; thus, the richer can easily hire the poor, particularly women, and negotiate a settlement with them for a lower

wage rate. The Char-dwellers tried to understand climate change the way they observe seasonality in their day-to-day life and experience adverse impacts of environmental disasters. Though the most cases, the perception of climate change of the Char-dwellers differs from the other climate victims in the other regions, they assume future climate risks in terms of high frequency and magnitude of extreme events can modify their LKEPs and that this may increase relief dependency. In the context of policy formulation and programme implementation, this study indicates that both DRM and CCA stakeholders at local level should consider community responses to environmental hazards in normal periods and in emergencies and their distinct variation in terms of spatial and socio-political differences. The study concludes, however, both community vulnerability and capacity also depend on external interventions through implementing various projects and programmes in a climate induced disaster prone TRB.

Keywords: Community responses; local knowledge, experiences and practices; DRM-CCA nexus; Brahmaputra-Jamuna River basin, Char livelihoods

Health Vulnerability of children and elderly people in floods affected chars in India: A study of the Nirmal Char

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Abstract

Frequent floods significantly impact the lives and livelihood of people living in riverine islands known as chars in India. The poor connectivity to the mainland and inadequate physical infrastructures made the Char dwellers more vulnerable to the impacts of floods. The study has been conducted in the Nirmal Char of Murshidabad district of West Bengal, where Char dwellers have been experiencing severe health challenges during the flood season. The study followed a mixed-methodological approach. This study involved an extensive field investigation conducted from December 2023 to February 2024. Total seventy-two households from eight villages in the char had been randomly selected for a questionnaire survey. Key informant interviews were conducted with health personnel and local government representatives. The study found that the floodwater rose to an average height of 1 meter, and it takes around 55 to 70 days to drain the flood water from the affected areas. The study examines the impact of floods on water supply, sanitation, and health services and its impacts on children and elderly people in Nirmal Char in Murshidabad district. The present study has found that children and elderly people experience more health challenges than others. Their physical inability and limited mobility make them more vulnerable to waterborne diseases. Skin infections and other ailments such as cholera, diarrhoea, dysentery and typhoid become more common during the flood season due to lack of access to clean water and adequate sanitation facilities. This study has revealed that the health vulnerability of children and elderly residents in flood-affected Chars depends on their socioeconomic status, access to resources, and community support. Around two-thirds of the tube wells and all toilets become unusable during flood season. As a result, waterborne diseases spread very rapidly. The study found that all pit latrines in the area also become submerged during floods, rendering them unusable and unsafe. Unfortunately, some residents have resorted to open water defecation due to the inundation of toilets, which further contaminates drinking water supplies. Although most people suffer from waterborne diseases, no adaptation approach has been followed. Only 6% of households drink boiled water and keep halogen tablets and emergency medicine at home. Therefore, the present study proposes that flood-proofing water and sanitation facilities may improve the health of children and elderly people in flood-affected chars in Murshidabad district.

Keywords: Char Dwellers; Disaster Health, Drinking Water, Sanitation, Public Health

Impact of Kosi River Floods on Trapped Communities in Bihar: Livelihood and Adaptation Strategies

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Abstract

The transboundary Kosi River, originating from the Himalayas, is a lifeline for millions across Nepal and India, sustaining livelihoods primarily through subsistence agriculture. However, the region faces persistent challenges exacerbated by the river's unpredictable course changes and devastating floods. To address these issues, embankments were constructed under the Kosi River Valley Project initiated in 1955, trapping communities within embankments, causing immense misery and hardship. This paper provides an in-depth examination of the impacts of the Kosi River Valley Project on trapped communities in Bihar, India. Through fieldwork in the Balwa Panchayat of Bihar, India, and a comprehensive literature review, the study delves into various aspects of the project's effects. It explores the historical context, project interventions, and post-project realities faced by embankment residents. Additionally, the research investigates livelihood strategies, adaptation measures, challenges, and opportunities within embankment communities, highlighting the resilience and resourcefulness exhibited amidst adverse conditions. The study also sheds light on the reliance on traditional agricultural practices, the significant role of local traders in the economy, and the complexities surrounding flood management and large-scale engineering projects. By examining the multifaceted interactions between livelihood dynamics, environmental challenges, and project interventions, this research provides valuable insights for policymakers and development practitioners seeking to address the vulnerabilities of embankment communities along the Kosi River.

Keywords: Kosi River, Trapped communities, Livelihood strategies, Adaptation, Flood management

Seasonal Hydrological Loading and Vertical Deformation in the Koshi Basin in the Himalayas

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Abstract

The Earth is considered to be elastic. The increase in temperature has resulted in the melting of mountain glaciers in the Himalayan region, and the release of the glacial load, along with the changes in rainfall patterns and variations in groundwater storage, all may lead to deformation. Therefore, it is important to study the surface mass loading variations that cause deformation on the Earth's surface. This study evaluates the impacts of seasonal loading and vertical crustal deformation in the Himalayan Koshi Basin using the Gravity Recovery and Climate Experiment (GRACE) datasets. The findings suggest that the hydrological loading change exhibits significantly negative, significantly positive, and moderately positive values during the pre-monsoon, co-monsoon, and post-monsoon seasons. Our analysis also found that the surface vertical deformation shows about -0.133 mm/year to -0.226 mm/year subsidence rate from 2012-2022. The subsidence is higher in the western part of the Koshi basin, primarily caused by increased surface loading and excessive groundwater exploitation, predominantly for irrigation purposes.

Keywords: GRACE, Koshi Basin, Himalayas, Deformation, Groundwater

Time-Space Transformation of Land Use Impact on The Precipitation and NDVI in The Hindu Kush Himalaya Region in The Era of Global Climate Change

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Abstract

The Hindu Kush Himalaya region plays an important role in maintaining the eco-hydrological process in the Asian countries and also one of the largest ice storages after the Arctic and Antarctica. These regions are highly vulnerable in the world due to climate change and increase in the frequency of extreme events due to precipitation. For the assessment of land use impact on the precipitation and Normalized Difference Vegetation Index (NDVI) datasets were used. The multi temporal & sensor data were used to evaluate the trend magnitude of the climate change. The ESA-CCI datasets used for the land use, PERSIANN-CDR for the precipitation, and NASA-CDR for the NDVI. The expected outcome of the results was extremely useful for the policy makers and the government agencies. The results will help in the mitigation of climate change and sustainable water resource management in the HKH, also the South-East Asian countries. The two-river basin will face the major challenges with increase in the consequences of drought such as Ganga and Indus River basin system. As the precipitation plays an important role in achieving the United Nations Sustainable Goal (UN-SDG) such as SDG-1, SDG-2, SDG-3, SDG-13, SDG-14, and SDG-15 targeting agenda 2030. Nature Based Solutions (NBSs) can also be put forwarded for the sustainable management of water resource in these regions because monsoon precipitation also governed by the Hindu Kush Himalaya regions.

Keywords: Climate change, GIS, NDVI, land use, UN-SDG, water resource management

THEME 6
HYDRO-GEOCHEMISTRY AND HUMAN
HEALTH IN TRBS

Evaluating the Ecological Health of Wetlands in the Transboundary River Basin of the Sundarban Biosphere Reserve

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Abstract

Transboundary river basins in the Indian subcontinent host diverse wetland ecosystems, ranging from marshes to floodplains, exerting significant influence on regional hydrology and providing essential services such as water purification and habitat provision. Wetlands represent crucial ecosystems that provide many ecological services in the Sundarban Biosphere Reserve (SBR). This proposed research aims to thoroughly assess wetlands Health, employing a comprehensive approach that integrates geospatial and socioeconomic perspectives. By doing so, we seek to unravel the intricate dynamics interlinking these ecosystems, human communities, and resilience across transboundary river basins. Amidst the escalating threats posed by climate change, urbanisation, and anthropogenic activities, it becomes increasingly vital to scrutinise the ecological health of wetlands and their role in enhancing resilience. This research focuses on assessing the ecological health and resilience of wetlands within the transboundary river basins SBR, particularly emphasising critical geopolitical intersections reflecting policy intervention and conservation approaches. The study area is characterised by homogenous landscapes, intricate hydrological systems and the interconnectedness of rivers and wetlands systems across national borders. Leveraging WWF's HydroBASINS basin Level 5 and 7 for analysis, we aim to provide a comprehensive understanding of wetland dynamics and their implications for sustainable development. The objectives of this research are multifaceted: a) To evaluate Wetland Ecological Health and the current state of wetland ecosystems within transboundary river basins in the SBR. b) To integrate Geospatial and Socioeconomic Perspectives, fostering a holistic understanding of the interplay between wetlands, human communities, and resilience, including exploring livelihood vulnerabilities and adaptive capacities. c) To translate research findings into actionable policy recommendations aimed at transboundary wetland management, resilience enhancement, and fostering sustainable development practices. Through this interdisciplinary approach, we aim to contribute to informed decision-making and effective policy interventions for the conservation and sustainable utilisation of transboundary wetland ecosystems within the Sundar Biosphere Reserve and beyond.

Keywords: Ecological health, wetlands, transboundary river, Sundarban

**Assessment of River Water Quality for Ecological and Human Health Risk
Characterization in The Context of a Decaying River of Indo-Bangladesh Frontier
Region**

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Abstract

The present study aims to examine the Jalangi River's water quality to assess its suitability for drinking purposes and associated human health risks. Results indicate better water quality in the lower reach of the river in the monsoon and post-monsoon seasons. Principal component analysis reveals that K⁺, NO₃⁻, and total alkalinity (TA) play a dominant role in controlling the water quality of the study region, while, CaCO₃, Ca²⁺, and EC in the pre-monsoon, EC, TDS, Na⁺, and TA in the monsoon, and EC, TDS and TA in the post-monsoon controlled the water quality. The results of ANOVA reveal that BOD, Ca²⁺, and CaCO₃ concentrations in water have significant spatial dynamics, whereas pH, BOD, DO, Cl⁻, SO₄²⁻, Na⁺, Mg²⁺, Ca²⁺, CaCO₃, TDS, TA, and EC have seasonal dynamics (p<0.05). The water quality index depicts that the Jalangi River's water quality ranged from 6.23 to 140.83, i.e., excellent to unsuitable for drinking purposes. Human health risk analysis shows that 32.35% of water samples have non-carcinogenic health risks for all three groups of people, i.e., adults, children, and infants while only 5.88% of water samples have carcinogenic health risks for adults and children. The present study found that stagnation of water flow in the river primarily driven by the eastward tilting of the Bengal basin, triggered water pollution and ecological risk. Moreover, anthropogenic interventions in the form of riverbed agriculture, and the discharge of untreated sewage from urban areas are playing a crucial role in deteriorating the water quality of the river. This decay needs substantial attention from the various stakeholders in a participatory manner.

Keywords: Jalangi River, river water quality; water pollution; ecological risk, carcinogenic health risk; non-carcinogenic health risk; river decay

Transboundary River Water Pollution and the Adjacent Community's Perspective: A Study on Korotoya River in Panchagarh, Bangladesh

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Abstract

Upstream rivers typically have an advantage over the downstream rivers with the opportunity to transfer the contaminants to the downstream rivers. Geographically, Bangladesh is a country with significant number of rivers constituting the downstream parts of those rivers that originated in the other countries such as India. These rivers are known as “Transboundary Rivers” because of crossing the political boundary. There are 58 transboundary rivers that run across Bangladesh originated from India and Myanmar. These rivers are playing important hydrological and political roles because these transport a lot of sediments to aid land accretion in the estuary zone, and also increase riverbeds, carry pollutants and cause floods. In this complex web of rivers, the Korotoya River stands out as one of Bangladesh's six most significant transboundary rivers which also originated from India. Historically, Korotoya was a significantly huge river, but today, it faces the gradual encroachment of water pollution from its upstream activities. This study centers its focus on the Korotoya River in Panchagarh, Bangladesh and aims to investigate the transboundary water pollution impacts on the adjacent community shedding light on the gravity of the problem and its potential implications. For theoretical lens, the study employed Anthropocene highlighting the interconnected challenges faced by the community. The study has been conducted using mixed methodology with in-depth interview and observation as methodological survey tools. For data analysis, SPSS and thematic analysis techniques were followed and data has been interpreted through method triangulation. Findings reveal that the transboundary river pollution has had health, economic and environmental impacts on the adjacent community to the river. Health impacts, such as skin diseases, are prevalent among the community due to polluted river water, leading to reduced water consumption. Economically, the decreasing fish population in the river has forced some community members to shift occupations, impacting their income stability. The environmental impact is also evident, with a decline in fish diversity and an increase in environmental risks. Therefore, to address this issue government should prioritize collaborative agreements with upstream countries to include stricter regulations on reducing pollutants runoff in the rivers; alongside comprehensive support for affected communities should increase.

Keywords: Transboundary River, water pollution, adverse impacts, Korotoya river

Rainwater Harvesting and Challenges; A Probable Sustainable Water Management for Rohingya Community in Ukhia, Cox's Bazar, Bangladesh

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Abstract

Water scarcity and the growing demand for freshwater resources pose significant challenges to sustainable development in the Rohingya camps in Cox's Bazar, Bangladesh. Rainwater harvesting (RWH) has emerged as a practical and eco-friendly approach to address these challenges by capturing and utilizing rainwater for various purposes. This paper aims to study the concept of rainwater harvesting, highlighting its potential benefits, current challenges, and future perspectives. It overviews different RWH techniques, ranging from simple household systems to large-scale community projects, and discusses their effectiveness in water conservation and management. The paper also delves into the environmental, social, and economic benefits of rainwater harvesting, including its potential to alleviate water stress, enhance resilience to climate change, and promote self-sufficiency. Furthermore, this study discusses potential solutions and strategies to overcome these challenges, emphasizing the importance of integrated approaches. Finally, the paper explores the prospects of rainwater harvesting, including technological advancements, innovative applications, cost-effectiveness of groundwater vs rainwater, and potential synergies with other sustainable water management strategies. It highlights the significance of rainwater harvesting as a viable solution to water scarcity and advocates for its broader adoption in water resource management policies and practices. Moreover, a cost analysis reveals compelling economic advantages associated with rainwater harvesting. Compared to conventional network-supplied water, rainwater harvesting is a more cost-effective solution. Taking the initial installation expenses, the first-year cost of supplying one litre of rainwater is estimated at 2.73 BDT. Remarkably, the cost of rainwater supply per litre drops 0.17 BDT after ten years, demonstrating the long-term affordability of this approach. In contrast, when considering only operational expenses (OPEX) for groundwater supply, the per-liter cost remains at 0.09 BDT. The paper addresses water quality concerns, particularly in Cox's Bazar region. It demonstrates that rainwater harvested in the camps meets the essential physical, chemical, and bacteriological parameters, ensuring a safe and reliable water supply. This highlights the quality assurance of rainwater harvesting as a sustainable water source in the camps.

Keywords: Rainwater harvesting, sustainable water management, water conservation, climate change resilience, Rohingya Crisis response

Assessment of Forest Landscape using Spatial Matrices in a Trans-boundary Region of River Ajay between West Bengal and Jharkhand State, India

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Abstract

River represents a perfect instance of natural barrier wherein diverse nature of ecological character appears in its trans-boundary region. The present study has been carried out in the trans-boundary region of River Ajay to examine the diverse nature of ecological health of forest landscape using spatial matrices in remote sensing and GIS environment. One bank of the river lies under the jurisdiction of CD block of Barabani of West Bengal and the other under the Nala block of Jharkhand. The study employed two satellite images of 2000 and 2023 for the assessment of landscape matrices of both class and landscape level. The result shows that various anthropogenic activities including mining, expansion of built-up area has been found to be responsible for large scale modification of forest landscape and riverine morphology in Barabani block whereas the modification is somewhat limited in the other bank. The result of class level indices also reported that, the forest land in the West Bengal counterpart not only fragmented by the formation of open cast coal pit but also experienced huge spatial loss over the specified time. Besides that, the fluvial morphology has been profoundly modified by the digging of open pit. This phenomenal change of the landscape structure is a matter of serious environmental concern that needs immediate attention for the sustainability of the region.

Keywords: Trans-boundary region, ecological health, forest landscape, ecological health, sustainability

THEME 7
CLIMATE CHANGE, LIVELIHOODS, AND
SUSTAINABILITY IN TRBS

Impact of Climate Change on Displaced People in Satkhira, a Coastal District in Bangladesh's Transboundary River Basin (TRB)

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Abstract

Due to climate change, extreme climate events are becoming more rampant in Bangladesh, such as the devastating cyclones Sidr in 2007, Aila in 2009, Roanu in 2016, Bulbul in 2019, and Amphan in 2020. These climate events are creating immense disruption to the lives and livelihoods of the affected people. The climatic disaster-affected people have incurred colossal damage and losses, and many have been displaced to new places in search of livelihood opportunities. In this context, our qualitative study aims to explore the impact of climate change on displaced people in Satkhira, a coastal district of Bangladesh. The objectives of this research are to ascertain the direct and indirect reasons for displacement (change of place of living and working, to understand the impact of climate change on displaced people (on individuals, family members, and community), particularly on the lives and livelihoods and, to identify the coping mechanisms that the displaced people have adopted for themselves. For this study, both the primary and secondary data were collected. Secondary data were collected through a literature review. Primary data were collected through semi-structured questionnaire interviews and Focus Group Discussions (FGDs). About fifty (50) interviews were taken using a semi-structured questionnaire. The respondents were climate change-induced displaced people. Three (3) FGDs were done too. The study area was Satkhira, and the selected four Upazilas there were Satkhira Sadar, Tala, Ashashuni, and Shyamnagar. Satkhira is a climate change-affected coastal district of Bangladesh. It is also located in Bangladesh's Transboundary River Basin (TRB), where two transboundary rivers, the Raymangal, and the Ichamati-Kalindi, flow through Satkhira, bordering West Bengal of India.

Findings show that the direct reasons for displacement are extreme climate events like- cyclones (mainly after *Sidr & Aila*), tidal surges, flooding, riverbank erosion, embankment failure, and salinity intrusion. Some indirect reasons for displacement include waterlogging from cyclones, erratic rainfall, high temperatures, crop failure, loss of livelihood, and diseases. Most displaced people were from the southern part of Satkhira, especially Shyamnagar and Ashahsuni Upazila, and moved northward to Satkhira Sadar and Tala Upazilas. Many reported that their physical and mental health deteriorated due to climate change and being displaced. Displacement affected their lives and livelihood immensely, as there are both positive and negative reviews on the living conditions before and after displacement. It was found that their resilience has also increased as they fight climate change-induced disasters regularly. Even after being displaced, many were affected by cyclones like Bulbul and Amphan. Many have adopted “displacement” as their coping mechanism, while some others still struggle to meet their ends in a new place.

Keywords: Climate change, Displacement, Coastal disasters, Satkhira, Transboundary river, Resilience

Food-energy-water nexus amidst climate change in South Asia

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Abstract

A study by the Food Agriculture Organization on strengthening food security and nutrition in South Asia established that over 14% of the region suffers from hunger and malnutrition (FAO, 2019). The percentage population of food insecure population further increased to 21% in 2022 (FAO, 2022). This study further provided recommendations for strategies that will enable the achievement of sustainable development goal two of zero hunger by 2023. One is a new regional vision for food and nutrition security, developing a new set of strategies for programmes consistent with SDG2 and institutional strengthening and human resource capacity building. Food production through agricultural activities is predominantly practiced in South Asia accelerated by the 70% of individuals living in rural areas. The region's agricultural potential is however disadvantaged given its small land area of about 5.1 million square Kilometres. The region's location in water resources ecosystem exposes it to soil erosion and land degradation, hence impacting agricultural productivity. Climate change-related challenges, unfavourable trade policies/ regulations, and an increase in oil prices have resulted in food insecurity in the area. This paper assessed from secondary sources, the food-water-energy nexus amidst climate change in Southeast Asia. The specific objectives under investigation were, first to establish the role of climate change in the food-water-energy nexus, to identify the current issues in food, water, and energy affected by climate change, and lastly to establish anticipatory actions to mitigate against climate change in the region. Secondary data from multiple sources were reviewed and thematic analysis was used to structure collected data and discuss it having addressed the objectives. The results from the paper established that climate change and food-energy-water nexus are related. The study also established that the relationship is both negative and positive currently. The study further established that there are already ongoing anticipatory actions to address climate change concerns in the region though not adequate. The study recommended changes in strategies with a focus on adopting a multi-sectoral and multi-collaborative approach to addressing these concerns. Secondly, a review of socio-economic status to support the two locations differently based on the need. Thirdly, accelerate the achievement of SDG 2 by implementing innovative solutions and lastly strengthen monitoring and evaluation system through evidence generation.

Keywords: Food, energy, water, climate change, South Asia

Unveiling the Paradox of Nature: A Multidimensional Analysis of Backwardness and Vulnerability in the Sundarban, India

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Abstract

The Sundarbans, which have been victims of frequent natural calamities but at the same time are blessed with a flourishing tourism industry, reveal the paradox of nature. However, despite the economic potential of tourism, migration remains a prevalent livelihood strategy in the region. This study delves into understanding the multifaceted dimensions of backwardness in the Sundarbans region of India by analyzing the interplay between socio- demographic and physical attributes. The study applies a complex procedure by carrying out the Coastal Vulnerability Index (CVI) measurement as the preliminary step to pronounce the potential of the coastal settlements to risks brought by the changing environment. The next phase consists of a study of the Demographic Backwardness Index (DBI) which has been specifically designed to give details on the main socio-economical weaknesses of the inhabitants of the Sundarbans area using socio-economical deficiencies. Specifically, DBI uses indicators of human development from the demographic data and HLPCA like Female status, education, housing conditions, and wealth of a family, to define deprivation or the degree of backwardness at a village level. Through normalization and composite scoring techniques, the study evaluates the level of backwardness and employs multivariate-ordinal logistic regression to identify significant factors shaping regional disparities. Additionally, the Sopher's Index is utilized to unveil inequalities in backwardness distribution among high and low CVI clusters. The integration of CVI and DBI offers a comprehensive understanding of the drivers of backwardness in Sundarbans, shedding light on the intricate socio-economic and demographic dynamics at play. Research has identified these as the key determinants such as education, housing conditions, and resources that underpin this high degree of backwardness. By discerning between demographic and natural factors, this research provides valuable insights for policymakers and stakeholders, informing targeted interventions to address regional challenges and foster inclusive development in vulnerable coastal communities.

Keywords: Demography; socio-economic, backwardness; coastal vulnerability; sopher's index; Sundarbans

Hydro-diplomacy: An Approach to Regional Cooperation in South Asia

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Abstract

Hydro-diplomacy is a new approach to river basin management and has two very important components, they are water and diplomacy. Water is multi-dimensional, multi-disciplinary, and multi-linear. It is linked to livelihood, food, energy security and socio-cultural as well as religious feelings. Diplomacy is also not only about two diplomats carrying out the negotiations between the countries. Both these themes have four major ingredients of a national policy. First is national sovereignty, second is national interest, third is the national identity and fourth is the national power. So, these four components drive the entire international relations, foreign policy, and diplomacy. A successful diplomatic effort occurs when these four factors converge for national gains and goals. In South Asia, the emergence of resource nationalism has serious implications and water is the most critical factor. It means an absolute control over water where the upper riparian can harness or exploit water resources be it rivers, lakes, aquifers etc. Once cooperation efforts happen in South Asia, like in Indus Water Treaty, Farrakka Agreement, Mahakali Agreement and so on, the states feel their national sovereignty is eroding and they tend to withdraw from it, or the treaty will be in a standstill position. In this paper I analyse the role of hydro-diplomacy in South Asia and the scope for regional cooperation by taking various case-studies in the region. The objectives are how resource nationalism shapes hydro-political tendencies in South Asia and the role of China as a hydro-hegemon in the region. The Chinese hydropower projects in Africa, Latin America and in South Asia are also part of this resource nationalism project, we can see the regional parochialism especially in Baluchistan of Pakistan where they rejected the idea of China-Pakistan Economic Corridor to move through it. Kaveri water dispute in South India, Teesta water dispute in Bengal and in Nepal also we can see the elements of regional disputes as well as collaboration efforts. Here the different levels of hydro-diplomacy can be used like multi-scalar, multi-track approaches dealing with national, state and grassroot levels. Hence, we need such instruments and institutions to cope with the phenomenon to establish regional cooperation in South Asia. The methodology used is mostly exploratory and qualitative data to understand hydro-diplomacy in more of a conceptual rather an empirical one. By this paper I argue about a multifaceted perspective of approaching water issues through the socio-political, ecological, cultural, technological, and psychological lens. We will examine the new water discourses on riverine diplomacy in South Asia as an alternative way of exploring hydro-diplomacy.

Keywords: Hydro-diplomacy, South Asia, Resource nationalism, Regional Cooperation

Ganges Water Treaty: resolving the problems through cooperation between India and Bangladesh

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Abstract

International cooperation has become a universal mandate for governing transboundary water bodies. Diverse stakeholders promote cooperation to achieve sustainable and equitable benefits from and for transboundary water bodies. However, calls for international water cooperation operate on the presupposition that cooperation is an unambiguous concept. The complexities of water management, exacerbated by climate change and increasing demand, have led to disputes between the riparian states. This kind of dispute can occur for a multitude of reasons, including alterations to borderlines, uncertainties surrounding the legitimacy of boundary treaties, the historical context of certain agreements, and the expiration of treaty provisions. However, amidst these challenges, the Ganges Water Treaty stands as a beacon of cooperation, facilitating dialogue and sustainable management of shared water resources. The Ganges Water Treaty establishes mechanisms for information exchange, joint projects, and dispute resolution, fostering a framework for mutual benefit and equitable sharing of the Ganges waters. Furthermore, the treaty promotes joint initiatives for water quality improvement, flood management, and sustainable development along the Ganges basin. These provisions have bolstered trust between the two nations, laying the foundation for cooperative water management practices. In conclusion, the Ganges Water Treaty exemplifies the potential for cooperation and diplomacy in addressing transboundary water issues. By fostering dialogue, sharing benefits, and promoting sustainable development, India and Bangladesh have set a precedent for effective water governance in South Asia. However, continued commitment, innovation, and resilience are imperative to overcome emerging challenges and secure the future of the Ganges basin for generations to come. This paper highlights the role of the Ganges Water Treaty in resolving conflicts and fostering collaboration between India and Bangladesh. The study concludes that transboundary water cooperation as an abstract ideal overlook the fact that cooperation as a practice emerges from and operates within specific historical, political, cultural, and economic contexts.

Keywords: Transboundary water treaty, Ganges water treaty, international water cooperation, sustainable sharing, cooperative water management



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