Paper ID	234
Author(s)	Repenstar Khongjee, Hiambok Jones Syiemlieh, Kulhiu Mero and Alvareen Lyngdoh Nongpiur
Title	Trends and Variability of Rainfall and Temperature in Northeast India: Implications for Climate Change Adaptation.

Abstract

Rainfall records in India are about a century ago. Changes in precipitation and temperature have been seen occurring all around the world. There are strong and weak phases, especially for India being influenced by the South west Monsoons. For North Eastern India, a very important focal point in terms of precipitation where Cherrapunjee is known to receive one of the world's heaviest rainfalls. In fact, rainfall in different areas of North East India has some kind of proportionality with that received in Cherrapunjee. Rainfall in Cherrapunjee has been observed to have a decreasing trend in the last 30 years. However, in different areas, there are different observations. On the other hand, temperature is gradually rising following global warming trends. While these changes are going on this research seeks to analyse the patterns and variations in precipitation and temperature in the region during the past century, utilising data from the Indian Meteorological Department (IMD) and supplementary secondary sources. The study used a statistical methodology to analyse annual, seasonal, and extreme weather patterns, employing techniques such as linear regression, Mann-Kendall tests, and Sen's slope estimator to identify trends. Spatial analysis is performed using GIS to delineate variability and identify at-risk areas. The study uses qualitative approaches to engage with the local community in order to understand the socio-economic impacts of climate variability and their indigenous knowledge-based adaptation mechanisms.

Keywords	Rainfall Trends, Cherrapunjee Rainfall, Climate change, Mann-Kendall test, Human Adaptation, Northeast India.

Paper ID	208
Author(s)	Abhishek Ghosh, Repenstar Khongjee, Kulhiu Mero and Hiambok Jones Syiemlieh
Title	Tracing the Environmental History of River Regulation: Human Interventions and Morphological Changes in the Mayurakshi River, Eastern India

Abstract

The regulation of rivers through human interventions has left a lasting imprint on their morphology and ecological dynamics. This study explores the environmental history of the Mayurakshi River in eastern India, examining how the construction of the Massanjore Dam (1950s) and Tilpara Barrage (1970s) has influenced channel adjustments and geomorphic stability over time. Using six numerical indices—Active Channel Width Variation Index (ΔW%), Erosion/Deposition Index (ED), Active Channel Stability Index (ACSI), Net Active Channel Change (NACC), Active Channel Formation Rate (ACFR), and Active Channel Abandonment Rate (ACAR)—the study quantifies lateral channel adjustments (CA) and assesses the river's evolving geomorphic status (GS) and Morphological Alteration Index (MAI).

The results indicate a transformation from a sinuous-wandering to a braiding-wandering channel pattern due to hydraulic interventions. Between 1990 and 2000, frequent floods accelerated channel widening (ΔW%: +10.8 to +29.2%), sediment redistribution (ED: 2–51), and active channel changes (NACC: 2–12), contributing to increased geomorphic activity (GS: 4.22–4.59). However, from 2001 onwards, the lower-middle reaches experienced degradation and narrowing (ΔW%: +19.0 to -25.5, NACC: -1.13 to -10.40), driven by the stabilization of marginal bars (ACSI: 89–98%). The MAI reveals that human influence increasingly governs fluvial processes, particularly in the middle and eastern reaches (MAI: 0.59–0.64). Principal Component Analysis

(PCA) and Cluster Analysis (CA) highlight that morphological degradation in the regulated sections is primarily linked to declining fluvial functionality, expanding artificial modifications, and a reduction in geomorphic stability.

By examining historical patterns of river regulation and its geomorphic consequences, this study contributes to the environmental history of human-river interactions. It emphasizes the long-term impacts of hydraulic structures on riverine landscapes and highlights the importance of incorporating historical perspectives into sustainable river management and ecological restoration efforts.

Keywords:
Environmental History; River Regulation; Floods; Human Impact; Channel Adjustment; Geomorphic Change; Eastern India; Morphological Alteration; Fluvial Dynamics.

Keywords	Channel Adjustment; Cluster Analysis; Geomorphic Status Index; Eastern India; Morphological Alteration Index; Principal Component Analysis, Water, Human interferences, Floods.

Paper ID	277
Author(s)	Subashisa Dutta
Title	Socio-Hydrology and Sustainable Development: Insights from the MSTG River Linking Project in India.

Abstract

The growing challenges of water scarcity, fluctuating rainfall, prolonged dry spells, declining groundwater levels, and increasing population underscore the need for sustainable water resource management in India. River linking, a proposed solution, aims to mitigate floods and droughts by redistributing surplus surface water to water-deficient regions. The Manas-Sankosh-Teesta-Ganga (MSTG) river linking project addresses these challenges by targeting socioeconomic and environmental issues in Barpeta, Bongaigaon, Dhubri, Kokrajhar, Cooch Behar, Jalpaiguri, and Katihar districts of India. Field surveys and Focus Group Discussions (FGDs) reveal critical agricultural constraints, including low productivity, poor irrigation, and water contamination with iron and arsenic, leading to severe health impacts. Additionally, river erosion, frequent flooding, and inadequate government support exacerbate economic uncertainty, forcing significant migration for better livelihoods. Fuzzy Cognitive Mapping (FCM) highlights the complex interplay between these issues and the transformative potential of river linking. The project promises to enhance agricultural productivity, improve water quality, and reduce rural economic vulnerabilities while fostering resilience against climate variability. However, its success hinges on a comprehensive approach encompassing effective policy implementation and active community engagement. The MSTG river linking project emerges as a sustainable strategy to address the multidimensional challenges of water scarcity, rural development, and environmental degradation, paving the way for long-term socio-economic improvement in the region

Keywords	river, human dimension, disasters

Paper ID	275
Author(s)	Marina Langhu, Masashi Kiguchi, Taikan Oki and Shinichiro Nakamura
Title	Flood Inundation in Lower Brahmaputra River Basin under Human-Flood Interaction

Abstract

This study aims to clarify the socio-economic and environmental factors influencing the settlement of

communities in high-risk floodplains of the Lower Brahmaputra River Basin, focusing on their interactions with monsoon-driven floods. A socio-hydrological modeling approach was employed, integrating quantitative data on population dynamics, agricultural production, water levels and social memory with qualitative assessments to evaluate the impacts of flooding on agricultural production systems and associated risk dynamics. The analysis used the models to simulate demography and agricultural production independently, revealing that flooding poses both challenges and opportunities, significantly influencing agricultural practices and community resilience strategies. The study highlights significant trade-offs between agricultural productivity and flood risk, underscoring the importance of social memory in shaping adaptive responses. Future work aims to integrate demographic dynamics and agricultural production systems within a unified modeling framework, enabling a more comprehensive understanding of human-flood interactions and offering insights into sustainable development strategies for flood-prone regions.

Keywords	socio-hydrology; flood risk model; agricultural production; flood risk management

Paper ID	217
Author(s)	Azusa Fukushima, Taiichi Hayashi, Toru Terao, Fumie Murata, Masashi Kiguchi, Yusuke Yamane, Masahiro Tanoue and Hideyuki Kamimera
Title	Data rescue project of meteorological data observed in private tea gardens in Assam, India

Abstract

In Assam, India, many tea gardens are located in the Brahmaputra-Barak basin. These tea gardens(estates) that were established during the era of British India are doing own meteorological observations of the temperature and rainfall in each tea garden. The observation has been introduced by British people who were established or managed the tea gardens as a pioneer, and it has continued by Indian managers or owners still now. Our group is planning to digitize these observational data and aim to use it to analyze the long-term trends, extremes, and inter-annual or inter-seasonal variations of precipitation in the detailed regions. To clarify the current situations of the private tea gardens in Assam, we visited 11 tea gardens. The air temperature and rainfall were observed in all gardens. Some tea gardens have Stevenson (Instrument) shelter for the thermometer. The thermometer is the maximum-minimum thermometer (Six's thermometer). Type of the rain gauge is the 5-inch manual (water storage type) rain gauge. In spite of the available data period is different on each garden, almost garden has more than 15 years. We'd like to discuss with an academic value of this new dataset through the case study of extreme heavy rainfall events occurred in Assam.

Keywords	Air, Land, Water, Data rescue, meteorological observation, Tea gardens

Paper ID	223
Author(s)	FUMIE MURATA, Toru Terao, Hiambok Jones Syiemlieh, Laitpharlang Cajee and Taiichi Hayashi
Title	Rainfall variability in the northeast Indian subcontinent

Abstract

The northeastern part of the Indian subcontinent is an interesting region with various interactions between its topography and weather. This area belongs to the Indian monsoon region, and is characterized by distinct summer monsoon rains and a dry winter season. Northeast India has a unique topography, surrounded by high mountains to the east and north. In this region, the inflow of warm and moist southwest winds brings significant

rainfall. On the other hand, when low-pressure systems make landfall from the Bay of Bengal and move northeastward across the Indian subcontinent, the southeast winds dominate in northeast India, leading to dry spells. The alternation between southeast and southwest winds occurs on timescales of one week to a month, known as intraseasonal oscillation. In the literature of the Bengal Plain, the relationship between the alternating east and west winds experienced on the ground and precipitation or flooding is well-known. Additionally, it is characteristics that precipitation tends to occur during specific hours of the day, reflecting the diurnal variation in wind structures. In the Brahmaputra River basin and the southern slope of the Himalayas and Meghalaya plateau, which are adjacent to the Bengal Plain, rain is more likely at night. During the daytime, rainfall is more common in the mountainous regions around the Brahmaputra Valley and the Bengal Plain.

Keywords	water, disasters