International Journal of Early Childhood Special Education (INT-JECSE)
DOI: 10.48047/INTJECSE/V14I6.357 ISSN: 1308-5581 Vol 14, Issue 06 2022

ASSESSING THE SALIENT FEATURES OF THE BIOLOGICAL, ENVIRONMENTAL AND SOCIOECONOMIC CHARACTERISTICS OF THE HIMALAYAN BASINS

AVNISH CHAUHAN
Department of Environmental Science, Graphic Era Hill University, Dehradun, Uttarakhand, India 248002

ABSTRACT

The catchment research relied on both direct surveys in the project regions and secondary sources of floristic information. Vegetation was sampled in several parts of the study area to learn more about the neighborhood's composition. The length of the Indian Himalayan area is over 2,500 kilometers, while its breadth is between 220-330 kilometers. Due in part to incompatibility between data collected by different individuals/institutions and a lack of data on many important attributes, the available data on the spatio-temporal dynamics of biophysical, economic, and social attributes of environment is inadequate to understand the interactions between biodiversity, climate change, and human well-being. Conditions in NW-1 and its intervention zones were determined using a combination of desk research, in-field observations, laboratory testing, and stakeholder input.

KEYWORDS Himalayan Basin**,** Environment Impact Assessment, Socio-Economic, Geographic

INTRODUCTION

The Teesta Stage-IV High-Efficiency Project EIA used industry-standard EIA procedures. The current research was designed around the guidelines established for the development of EIA and EMP reports by the Ministry of Environment and Forests (MOEF), Government of India. Data on environmental impacts could be found, collected, and organized with ease because to the standardized nature of all the procedures. The data collected in this way has been analyzed and presented in a variety of visual ways to facilitate comprehension and choice. Research was conducted in the project area, impact zone (10 km radius), and catchment region. We used GIS techniques to analyze spatial databases we compiled of physiographic characteristics, which included data from the Survey of India (SOI) topographic sheets and satellite imagery. Primary surveys throughout the project area corroborated existing information in the Detailed Project Report on the geomorphology, stratigraphy, and structural elements of the regional geology around the project area. Moreover, Key seismicity measures were evaluated using published literature on seismicity and seismo-tectonics of the area's varied structural properties.

The catchment research relied on both direct surveys in the project regions and secondary sources of floristic information. Vegetation was sampled in several parts of the study area to learn more about the neighborhood's composition. The area was separated into the powerhouse site on the western side of the Teesta River and the Dam site on the eastern side of the river, so that researchers could collect samples from both sides of the river. Standard phytosociological techniques were used to two locations to measure frequency, density, total

DOI: 10.48047/INTJECSE/V14I6.357 ISSN: 1308-5581 Vol 14, Issue 06 2022

basal cover, IVI, and diversity index. Primary and secondary sources were used to compile data on the fauna of the Teesta river's catchment region.

LITERATURE REVIEW

Andrew Orr et.al (2022) The melting of snow and glaciers, as well as summer monsoonal rainfall, are the primary sources of water for the river systems draining the Upper Indus Basin (UIB). Large numbers of people in the area rely on this water for a variety of reasons, including agricultural, home consumption, and energy generation, which puts a heavy strain on the supply. Changes in the timing and composition of runoff are projected to have significant (but poorly measured) effects on these supplies in the UIB area in the future. The increasing strain on these resources from rising demand is a significant adaptation problem, especially considering how reliant populations and ecosystems are on them. Given the interconnected nature of the UIB's hydroclimate, cryosphere, water resources, and human activities, it's clear that a holistic approach to research that takes into account both the social and natural/environmental sciences will be necessary for the region to successfully adapt to current and future hydrological and climate change. Using a horizon-scanning approach, we've compiled a list of the UIB's top 100 issues about climate change and water, broken down into social and natural science. Over three broad categories—"governance, policy, and sustainable solutions,""socioeconomic processes and livelihoods," and "integrated Earth System processes"—14 themes emerge at the periphery of contemporary thought and research. Making academics, funding agencies, practitioners, and policymakers more aware of these cutting-edge knowledge gaps and possibilities is crucial to closing them.

Moses C. Wambulwa et.al (2021) Despite the fact that one-third of the world's flora and fauna is found in mountain ecosystems, our knowledge of how this variety is maintained through space and time is limited, to say the least. The Himalayas are home to one of the world's richest floras and a complex alpine ecosystem characterized by great topographic and climatic variety. Due to its high endemism and increasing human pressures, The Himalayas rank high on the list of the world's most important places for plant and animal life. The Himalayas are a great place to research the processes of floral trade, diversification, and geographical and temporal distributions due to the range of conditions found there. Here, we summarize the history, distribution, and adaptations of Himalayan flora to climate change by reviewing relevant literature. We found that the Himalayan region is home to a wide variety of plant and animal life, and that the Hengduan Mountains were responsible for providing the bulk of the Himalayan floral elements that underwent diversification beginning in the late Miocene and leading to the region's current high level of endemicity. We also discover that changes in Himalayan geology and climate likely contributed to this era of variety that persisted throughout the Miocene. This study summarizes some of the general trends and current studies addressing species dispersal, elevational gradients, and the influence of climate change on Himalayan plant species.

Pema Tshering Lepcha et.al (2020) In order to keep several ecosystem functions running, water is essential. All of the people and wildlife in this area depend on the water supply. Researchers have noticed that the Himalayas are rising faster than the global average, which may have devastating impacts on alpine water resources, since the melt from snow and glaciers is the main source of the flow of the rivers that feed into them. Several lives are lost, crops are destroyed, and a heavy financial toll is incurred practically year as heavy monsoon rains overwhelm the upstream highlands and then the downstream plains. Extreme weather occurrences, such as monsoon rains, which cause flash floods, landslides, and debris flow; and subsequently the drought during dry season, have had a substantial influence on regional water security. Land cover and land use in Himalayan watersheds have changed in recent years due to human activities including economic development and population rise. Changes in land cover caused by human activities like farming, grazing, tree planting, urbanization, etc. have impacted the global hydrological cycle by impacting water balance and rerouting water flow. There is a high demand for marine habitats, but their supply is modest since they are dependent on the unique flow pattern of rivers. Yet, disruptions in the flow pattern downstream caused by upstream infrastructure development threaten the existence of aquatic life and the lives of the populations who rely on it. Initiating a water resource monitoring and observing system and using a suitable hydrological model are both recommended for better understanding the Himalayas' hydrological processes.

Christopher A. Scott, et.al (2019) The Hindu Kush Himalaya (HKH) has been called the "water tower for Asia" because to the crucial role it plays in preserving the safety of Asia's water, food, energy, and environmental supplies. The ten main rivers that originate in the HKH provide water to two billion people throughout Asia, as well as aiding in the production of food and energy and providing a host of other ecosystem services. In this chapter, we compile the state-of-the-art research on the HKH's water resources, variety of water sources, climate change's effect on predicted water supply, water demand's disintegration, and legislative, institutional, and governance roadblocks are all threats to the region's water security.

Arshad Ashraf (2017) The loss of farmland and natural water supplies is a growing concern in the Himalayas. Using the RUSLE model and Geoinformatic techniques, Pothwar's high and medium rainfall zones were analyzed to determine soil erosion risk in the Rawal and Ghabbir watersheds. It was calculated that 29% and 14% of the Ghabbir watershed were in high- and extremely high-risk zones, respectively. Since vegetation in the Ghabbir watershed is low and sparse due to low rainfall, soil erosion across all slope and land use classifications is more severe there than in the Rawal watershed. Soil erosion is a major problem in the Rawal watershed, and it's becoming worse as urbanization spreads and trees are cut down.

HIMALAYAN REGION OF INDIA

The length of the Indian Himalayan area is over 2,500 kilometers, while its breadth is between 220-330 kilometers. The Western Himalaya consists of mountainous areas in Jammu & Kashmir and Himachal Pradesh. The climate, ecology, and traditional ways of life in the northeastern hill region outside of Sikkim and Arunachal Pradesh are strikingly similar to those of the main Himalaya. (Figure 1 and Table 1). There are many parallels between the north-eastern hill area of India and the Montane Mainland of South-east Asia, which includes parts of Cambodia, China, Laos, Thailand, Burma, and Vietnam.

DOI: 10.48047/INTJECSE/V14I6.357 ISSN: 1308-5581 Vol 14, Issue 06 2022

Table 1. Distinguishing features of biodiversity of Indian region of Himalaya (based on Sharma and Rana, 2021)

• Harbours 50% of total flowering species and 30% species endemic to the Indian subcontinent
• Harbours 10000 plant, 300 mammal, 977 bird, 176 reptile, 105 amphibian and 269 fresh water fish species, with 31.6, 4.0, 1.5, 27.3, 40.0 and 12.3% endemic to the region
• Habitat of 137 species listed in Red Data Book, with 56 species confined to the western Himalaya, 71 to the Eastern Himalaya and 10 species common to both regions
• Habitat of 360 wild plant species with food values
• Harbors several unique crop genetic resources, e.g., red colored strains of rice, bluish-green landraces of barley, black pea/field pea resistant to powdery mildew, naked barley (*Hordeum himalayens*), *Flemingia* sps., Job's tears (*Coix lacryma-jobi*)
• Harbours several unique livestock, e.g., Changthangi and Chegu goats producing cashmere (pashmina) wool and several local cross breeds of cow-yak, mithun-buffalo and donkey-horse
• Harbors 134 wild plants of ornamental values, hybrids of forage legume *Medicago falcata* and *M. sativa*
• Habitat of several plant species of global importance: Himalayan tahr (*Hemitragus jemlahicus*), pygmy hog (*Sus salvinus*), wild ass (*Equus kiang*); critcally endangered Himalayan quail (*Ophrysia superciliosa*); fully endemic birds of the Himalaya: Chestnut–breasted partridge (*Arborophila mandelli*, rusty-throated wren babbler (*Sppelaernis badeigularis*), white-throated tit (*Aegithalos niveogularis*) and orange bullfinch (*Pyrrhula aurantiaca*); one endemic reptile genus represented by a single species, the lizard *Micropholis austeniana* (holotype); Namdapha flying squirrel (*Biswamoyopterus biswasi*), golden languor (*Trachypethicus geei*), hoolock gibbon (*Bunopithecus hoolock*)
• World Heritage sites: Nanda Devi Biosphere Reserve, Manas Wildlife Sanctuary, Kaziranga National Park, Darjeeling Himalayan Railway, Kalka Shimla Railway and Great Himalayan National Park

MANAGING BIODIVERSITY FOR CLIMATE CHANGE MITIGATION: STRATEGIC ACTIONS

Ecosystem services, resilience in the face of climate change and other environmental challenges, and sustainable ways of life all rely on biodiversity. Attempting to protect every single species is impossible. When it comes to conservation, we need to know exactly what we're aiming to preserve and how.

Scientific experiments are seldom used to draw findings on effects and remedial measures for biodiversity conservation and climate change mitigation/adaptation. In addition, rather than being presented as specific instructions, the proposed remedial procedures are presented as overarching conceptual solutions.

Establishing A Long Term Participatory Ecological

Due in part to incompatibility between data collected by different individuals/institutions and a lack of data on many important attributes, the available data on the spatio-temporal dynamics of biophysical, economic, and social attributes of environment is inadequate to understand the interactions between biodiversity, climate change, and human well-being. Similar to the New Ecological Observatory Network, the Biodiversity Monitoring Programme

DOI: 10.48047/INTJECSE/V14I6.357 ISSN: 1308-5581 Vol 14, Issue 06 2022

of Switzerland (biodiversitymonitoring.ch), and the Long-Term Ecological Research Protocols programme, a network of long-term participatory ecological research sites should be established that unites all bioclimatic/agroecological regions. To untangle the intricate relationships between ecological and monetary aspects, a socio-ecological systems approach should be used. For successful community engagement, it is necessary to first identify cultural landscapes as the units of observation. The network should comprise ecosystems that are in a critical state of decline according to the criteria established by the IUCN Committee on Ecosystem Management. Connectivity with existing networks is essential for the success of the proposed system. To guarantee that research activities serve local, national, and global interests in a balanced way, a core group of scientists, managers, policy planners, and people's representatives should be created.

BASELINE ANALYSIS, STUDY AREA AND SALIENT ENVIRONMENTAL FEATURES

As part of the Environmental Assessment process, it is essential to undertake a study of the environmental baseline of the project region in order to appreciate the prior environmental conditions in and around the project area/alignment. Conditions in NW-1 and its intervention zones were determined using a combination of desk research, in-field observations, laboratory testing, and stakeholder input.

Table lists the secondary sources utilized in this investigation, including several meteorological departments, CPCB publications, the National River Ganga Basin Authority, and IIT consortium papers.

Primary data was collected from September 15, 2018, to February 28, 2019, at varying intervals and locations along NW-1, in areas designated for intervention, in areas where intervention is likely, in areas designated for maintenance dredging, at a few of the existing RO-RO jetty and passenger ferry terminals, and in environmentally sensitive areas. As this is a lining project, the innermost 500 meters on each side of the bank, as well as the first 2 kilometers and the last 10 kilometers of the NW-1 segment and the intervention zones, are designated the core zone. (Check out Map 1 for the research zone).

Figure 1: Study Area Map (NW-1)

DOI: 10.48047/INTJECSE/V14I6.357 ISSN: 1308-5581 Vol 14, Issue 06 2022

Environmental Setting and Salient Environmental Features of the Project Area

The 1620-kilometer-long NW-1 section of the Ganga-Bhagirathi-Hooghly River System begins in Haldia (Sagar) and ends in Allahabad. From Haldia to Nabadwip, the Hooghly River is affected by tides. The NW1 corridor is created by the Bhagirathi River from Nabadwip to Jangipur. Barges at Farakka and Jangipur control the flow of the Bhagirathi River. Navigable waterways are dependent on the main Ganga River flow from Farakka upstream. Upstream of the Farakka Barrage, the Bhagirathi and the main Ganga are connected via the Feeder Canal and the navigation lock at Farakka. The path of NW-1 includes four different states: UP, Bihar, Jharkhand, and West Bengal. Figure 2 depicts the NW-1's location and alignment maps.

Table 2 provides a summary of the most notable geographical characteristics within 500 meters, 2 kilometers, and 10 kilometers of NW-1.

Table 2: Salient Environmental Features along NW-1 Alignment

S. No.	Environmental Features	Within NW-1 (500 M)	Within 2 km area around NW-1	Within 10 km area around NW-1
1	Ecological Environment			
A	Presence of National Park/Biosphere	None	None	None
	Reserves, Tiger reserve etc.			
	Presence of Wildlife Sanctuary	Yes 1. Kashi Turtle Sanctuary at Varanasi 2. Vikramshila Dolphin Sanctuary Kahalgaon to Sultanganj 3. Hilsa Sanctuary stretch in west Bengal	None	Yes Udhwa lake sanctuary in Jharkhand (about 9 km away from NW-1

DOI: 10.48047/INTJECSE/V14I6.357 ISSN: 1308-5581 Vol 14, Issue 06 2022

B	Reserved /Protected Forests	None	None	Yes (Bethuadahari RF, Bahadurpur RF & RF near Rajmahal Hills)
C	Wetland of state and national interest	None	None	Yes (Udhwa Bird sanctuary)
D	Migratory route for wild terrestrial animals	None	None	None
E	Presence of Schedule-I Terrestrial Fauna	None	Yes Migratory birds near Farakka Barrage and surrounding	Yes Migratory birds at important birds' areas
F	Presence of Schedule-I Aquatic Fauna	Yes Dolphin, and Turtle	None	None
G	Important Bird Area	Vikramshilasanctuary area	Yes 1. Danapur Cantonment area 2. Mokama tal 3. Kurseala river course and diyara flood plain. 4. Farakka Barrage and surround area	Yes Udhwa lake sanctuary
H	Seismicity	NW-1 falls in Zone-III (moderate risk) and zone IV (high damage risk zone) as per Seismic Zoning Map of India		
B.	Social Environment			
I	Physical Setting	Rural, Industrial and Urban		

DOI: 10.48047/INTJECSE/V14I6.357 ISSN: 1308-5581 Vol 14, Issue 06 2022

	Densely populated area	Sirsa, Varanasi, Allahabad, Mirzapur, Chunar, Zoomania, Ghazipur, Gahmar, Buxar, Ballia, Chappra, Patna, Barh, Bihat, Munger, Bhgalpur, Kahalgaon, Sahibganj, Farakka, Berhampore, Katwa, Kalna, Kolkatta and Haldia are densely populated areas.
J	Physical Sensitive	Yes

CONCLUSION

Community-based adaptation methods must take into account local conditions, thus knowing how people will react to climate change is crucial. We analyzed local climate change data and farmers' views of climate change indicators such temperature and rainfall shifts, shifting seasons, and adaptation techniques using both objective and subjective methods based on observed climate records. Since this research only examined a small portion of the hilly farming systems in the Himalayan range and only considered a handful of socioeconomic factors, extrapolating its findings to a broader region would require making some fairly strong assumptions about the region's geography, culture, and agriculture. In this work, we give a comprehensive analysis of the worldwide dangers to agricultural output, linking the problems brought on by pests and diseases to irrigation pressures, soil salinity, and poor cultural management measures. EIA now includes a brand-new section on environmental risk analysis and management.

REFERENCE

1. Christopher A. Scott et.al “Water in the Hindu Kush Himalaya”2015

2. Arshad Ashraf “Modeling Risk of Soil Erosion in High and Medium Rainfall Zones of Pothwar Region, Pakistan”VOL. 54 NO. 2 (2017)

3. Pema Tshering Lepcha et.al “Hydrological significance of Himalayan surface water and its management considering anthropogenic and climate change aspects” doi:10.1088/1757-899X/1020/1/012013

4. Andrew Orr, et.al “Knowledge Priorities on Climate Change and Water in the Upper Indus Basin: A Horizon Scanning Exercise to Identify the Top 100 Research Questions in Social and Natural Sciences”Volume10, Issue4

5. Moses C. Wambulwa et.al **“**Spatiotemporal maintenance of flora in the Himalaya biodiversity hotspot: Current knowledge and future perspectives” DOI: 10.1002/ece3.7906

6. Amarasinghe, U. A.; Sharma, B. R.; Aloysius, N.; Scott, C.; Smakhtin, V. U.; De Fraiture, C.; Sinha, A. K.; and Shukla, A. K. 2005. Spatial variation in water supply and demand across the river basins of India. Colombo, Sri Lanka: International Water Management Institute. 37 pp. (IWMI Research Report 83).

DOI: 10.48047/INTJECSE/V14I6.357 ISSN: 1308-5581 Vol 14, Issue 06 2022

7. Bandyopadhyay, J. 1995. Water Management in the Ganges-Brahmaputra Basin: emerging challenges for the 21st century. Water Resources Development 11(4): 411-442.

8. Beecher, H. A. 1990. Standards for Instream Flows. Rivers 1(2): 97-109.

9. Bunn, S. E.; and Arthington, A. H. 2002. Basic principles and ecological consequences of altered flow regimes for aquatic biodiversity. Environmental Management 30: 492-507.

10. CPCB (Central Pollution Control Board). 1996. Water Quality Status and Statistics (1993 & 1994). Monitoring of Indian Aquatic Resources (MINARS/10/1995-96). New Delhi: Central Pollution Control Board. 459 pp.

11. DWAF (Department of Water Affairs and Forestry). 1997. White paper on a National Water Policy for South Africa. Pretoria, South Africa: Department of Water Affairs and Forestry.

12. Dyson, M.; Bergkamp, G.; and Scanlon, J. eds. 2003. Flow. The essentials of environmental flows. Gland, Switzerland and Cambridge, UK: IUCN. xiv + 118 pp.

13. Environment Agency. 2001. Managing Water Abstraction: the Catchment Abstraction Management Strategy Process. Bristol, UK: Environment Agency.

14. Extence, C. A.; Balbi, D. M.; and Chadd, R. P. 1999. River flow indexing using British benthic macroinvertebrates: a framework for setting hydroecological objectives. Regulated Rivers: Research and Management 15: 543-574.

15. Gopal, B.; and Chauhan, M. 2003. River Restoration in India: A Case Study of River Yamuna East Asia Regional Seminar on River Restoration, Kuala Lumpur, January 13-15, 2003.