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Local Knowledge, Perceptions, and Impacts of Climate Change in Ligligkot, Gorkha, Nepal: The Cultural Ecology Approach

Saroj Pokharel*

Lecturer, Department of Sociology, Tribhuvan University, Active Academy College, Basundhara,
Kathmandu, Nepal, <https://orcid.org/0009-0004-9336-423X>

Rahul Poudel

Teacher, Shree Gaunpharkodaya Higher Secondary School, Dhorphirdi, Tanahun, Nepal,
<https://orcid.org/0009-0004-6865-1106>

***Correspondence email:** pokharelsaroj44@gmail.com.

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Abstract: The study explores how the traditional inhabitants of Ligligkot, Gorkha Nepal, think about climate change and explore the Ligligkot people's style of living. Among various methods, mixed-methods research design was preferred to take the required data from 18 research-selected households in collaboration with both qualitative and quantitative techniques. Among various

informants, seven key informants, including two women and five men, were interviewed to take personal views on changes in farming practices and climate patterns over time. Focus group discussions (FDGs) were conducted with participants of different criteria, such as age and sex, to take various views. The study also focuses on climate variables such as rising temperature and very high or very low rainfall patterns and their effect on crop productivity. Findings from the survey showed that society has become warmer due to approaching more "closer to the Earth. The study showed changes in plant blooming ratios, like rhododendrons blooming twice a year. Between two genders, male and female, the study reveals impacts of climate change on women that are more significant to the economic and water-related effects due to their tremendous roles in managing household food security. The research also provides some local views on climate change and the related impact of socio-economic aspects, neglecting the adaptation strategies in indigenous rural communities. This research is essential as it searches for traditional information and views on climate change in Ligligkot, Gorkha, Nepal.

Keywords: Climate change, indigenous community, local perception, local knowledge, Ligligkot.

Introduction

Climate change refers to changing temperatures and weather patterns due to human activities over time (Shivanna, 2022). According to the data of the latest Intergovernmental Panel for Climate Change (IPCC, 2021), the verse of climate is controlled by humans, which seems to be unmatched in the last 2000 years and is boosting in different parts of the world. Climate change in the context of rural people is frightening and mainly depends upon subsistence agriculture (Nyahunda & Tirivangasi, 2019). Humans and the environment are closely associated in rural areas like *Ligligkot* village of Gorkha, Nepal. Humans cope with the environment at first, but as time goes on, they change the environment according to their will (Dasgupta & Badola, 2020). Many challenges related to climate change are highly based on caste, ethnicity, religion and culture (Crate, 2011). Very little research has been done on how traditional people manage their ideas and information to mitigate climate change. Climate change has raised the number and strength of extreme climatic hazards, which highly affect crop productivity (Sun et al., 2019). Moreover, if climatic events affect the agricultural structure, it raises the input cost of production (Newman & Noy, 2023). Rural inhabitants' way of living is affected by climate change impacts, but their traditional experience, information and wants receive few observations in climate studies and policy sector (Reyes-García et al., 2024). During the study in *Ligligkot* village in Gorkha, Nepal, the problem can be fulfilled by analysing the view and information of *Ligligkot's* inhabitants by focusing on agricultural practices and addressing climate change majorly in the socio-cultural aspect. The climate change scenario is an issue in both smaller and larger areas. Due to the changing climatic conditions, the rainfall patterns and temperature are also affected in different agroecological belts (Paudel et al., 2022). Among other variables, rainfall and temperature are the most important variables that are used to indicate variability and its relative change. Research on the view of climatic data of people was conducted,

which gives findings that rainfall and temperature have a broad role of impact on agricultural production and productivity in Moyamba district, Sierra Leone (Yila et al., 2023). Climate change produces several disasters affecting development, primarily cultural activities (Brabec et al., 2019). The central topic considered in this field is cultural ecology, which determines the bonding of culture and environment by considering how the community perceives transforming climatic measures (Crate & Nuttall, 2009). The research wants to include local perceptions of Ligligkot village people on the emerging topic of climate change by recognising the importance of climate change and including sociocultural aspects in an adaptation plan. The study also focuses on the effect of climate change on traditional farming methods which farmers have used from ancient times for their living.

Research Problem

Since climate change has gone beyond the limit, the United Nations Framework Convention on Climate Change (UNFCCC) was established in 1992, with agreements like the Kyoto Protocol (1997)¹ and the Paris Agreement (2015)² aiming to limit global temperature rise to below 2°C. However, Nepal is uniquely situated topographically and culturally, threatening the environment due to climate change's impact (Karki, 2024). According to some researchers from environmental psychology, climate change is not seen by the typical layman through the naked eye (Doyle & Swim, 2009). Naturally, climatic changes are linked with industrial activities that primarily affect rural communities people and further disturb the social and political criteria of health with involvement of great vulnerability and direct threat to their determination but in some cases, lead to oil and gas, mining, logging, or other projects that undermine environmental health (Ford, 2012; ILO, 2020). Climate change is a global issue, so the impacts of climate change not only affect the ecosystems and other social factors but also put forward changes in the behaviour of humans (Evans, 2019). The context of climate change is complex; it is driven by many factors which make it difficult to predict the impact of climate change, but if we change our lifestyles to some minimum criteria with fundamental things, we can restrict the rise of temperature to 1.5°C by 2100 (Rogelj et al., 2018). In hilly regions like Ligligkot, agricultural service Provider Companies in the sector of vegetable were more in the hilly region as compared to Terai, and problems associated with the hilly areas are irrigation and market inaccessibility and climate change in Terai (Devkota & Mishra, 2020). If we collaborate indigenous knowledge with scientific factors, it will ultimately meet the needs of farmers and increase products (Gbangou et al., 2018; Nyadzi et al., 2021). Most climate change studies in Nepal focus on natural sciences, but there is little research on how local communities perceive and experience these changes (Poudel, 2012; Regmi et al., 2016). Chepang society feels the impacts of climate change and identified that the effects of climate change are weather disasters, crop diseases, insects and pests, and health problems (Khanal et al., 2019). Ligligkot village is an excellent example of how cultural factors influence how people understand climate change. The village is situated at the base of the mountains, with a unique environment shaping the community's response to climate challenges. This study aims to explore how climate change impacts the cultural and farming

¹ <https://unfccc.int/resource/docs/convkp/kpeng.pdf>

² https://unfccc.int/sites/default/files/english_paris_agreement.pdf

practices of the people in Ligligkot. It also seeks to highlight how these changes affect their traditional knowledge and way of life.

Literature Review

The literature analysis indicates a vast research space regarding the sociological impact of climate change on indigenous communities in Nepal. Though traditional practices of agriculture and other systems related to climate change have been studied internationally, very little is known about how specific they are to Nepal. During the 20th century, there seems to be evidence of a connection between climate, atmosphere, and ecosystems (Steffen et al., 2015). With the help of traditional knowledge and the sociocultural effects of climate change, the study fills the gap in knowledge in Ligligkot. Most rural people in Nepal view the diverse impact of climate change and their effect on normal livelihood and traditional lifestyles (MoSTE, 2015).

Several studies have shown the importance of indigenous knowledge systems about climate change. For example, a study of apple farmers in Kulu village, India, by Vedwan and Rhoades (2001), showed that farmers base their understanding of climate change more on their observations of crop growth than on scientific data. Most people in Chitwan see the highest rainfall of 43.1%, and 13.2% in the Gorkha district say rainfall is uncertain and becomes different from consecutive years due to yearly variations in rainfall (Khatri & Pass, 2023). Similarly, Poudel (2012) highlighted how regional weather patterns and agricultural aspects influence local knowledge in Nepal.

Studies in the Bharatpur and Kumroj villages of Chitwan on climate change found that local causes, such as sanitation and cleanliness, are more critical than temperature and weather patterns other than climate change. Most people give a view on present environmental conditions but ignore climate change, temperature and weather. Moreover, when there is a topic of climate change, people do not pay attention and do not connect it to the local area but show some awareness (Nash et al., 2019). Climate change in high ratios is mainly seen in higher altitudes and shows large ecosystem disbalance (Kohler & Maselli, 2009; Krishnan et al., 2019). In an early definition, Crutzen and Stoermer (2021, p. 17) claimed the Anthropocene registers "the central role of mankind in geology and ecology", criticised by rural people for neglecting the importance of spiritual aspects. These examples show how important it is to consider cultural and spiritual factors when understanding local views on climate change.

Cultural anthropology helps explain how communities adapt to environmental changes. For instance, at the policy level, people believe that climate change affects places according to the place and is strongly related to the history of the environment (Ford et al., 2016). In the study of the different writer's differences and similarities in knowledge of climate change, they found theoretical differences in the impact of climate change (Goldman, 2018). Rural communities lack a direct transformation of the term 'climate change' (Arreourtua, 2019). The study found that climate change does not affect rural people through direct impacts but also through mutual factors of environmental change such as resource depletion (Arneth et al., 2020). Climate change deals with temperature, rainfall, and historical imbalance (Whyte, 2017). Rural inhabitants found that climate change must

collaborate with environmental factors (Li et al., 2021). Rai (2010) finds how national and international aspects interact with local findings.

Poudel (2012) shows how information on the climatic variability of Kathmandu Valley locally interacts with global climate discussions. They found that environmental and sociocultural aspects uplift farmers' knowledge and information. Sherpa (2014b) shows the perception of the Sherpa community in the Everest region, depicting the impact of socioeconomic factors. The relationship between people and climate change in Nhason Valley is viewed as a local adaptation strategy for dealing with the effects of climate change.

Theoretical Review

The study relies on the coordination between an individual and its environment, termed as cultural ecology. This type of approach mainly focuses on relationships of all the systems depicting characters of idea exchange, monetary flow, and information of product and content among funded and commercial areas. Culture is an area which is more spaceable and open than other models, such as the linear model (Holden, 2015, p. 4). Although there are various models, this research utilises the cultural ecology model, which is totally based on the climate change criteria and inspects the role of the environment in human adaptation and socio-economic practices. Understanding climate change in the context of cultural ecology shows how the human community interacts and adapts to a tremendously changing environment in research, policy, and ecological resilience fields. According to DeWalt and DeWalt (2011), the cultural ecology model is valuable in ethnological fieldwork because it helps deepen relationships and expands local circumstances with broader aspects. Such a framework is crucial for measuring daily activities and viewpoints of Indigenous communities on issues of the environment.

The study shows a massive gap in research, particularly in the socio-cultural aspect of climate change in indigenous communities in Nepal. Moreover, present studies have examined indigenous knowledge and adjusting techniques internationally, particularly in countries such as India and Tibet, so the specific socio-cultural aspects of climate change in Nepal remain undiscovered. Moreover, a few studies conducted in Nepal, such as Rai (2010), Poudel (2012), and Sherpa (2014a), show how environmental factors and socio-cultural factors build indigenous knowledge. Still, these studies do not label the broader implications of climate change on local adaptation methods. Therefore, this research fills these hurdles by exploring the regional perceptions of knowledge and socio-cultural feedback to climate change in Ligligkot, providing a deeper understanding of how these indigenous societies adapt to increasing environmental conditions.

Research Methodology

The study uses a mixed-methods research design, combining qualitative and quantitative data to prepare comprehensive data. Eighteen households in Ligligkot village, Gorkha, Nepal, were mainly purposive sampling selected based on mobility, credibility, and community engagement, with seven key informants chosen for far-down interviews to gather deep knowledge. Moreover, household surveys were used to accumulate socio-demographic and economic data on livestock,

crop productivity, and family composition. Furthermore, another method, such as focus group discussions (FDGs), was implemented to capture a broader view of the changing climate. Among quantitative and qualitative data, quantitative data were analysed using criteria such as frequency distributions and averages, while qualitative data went through thematic analysis, looking at socio-cultural and economic backgrounds. A cultural model approach was used to analyse and interpret the data, focusing on local knowledge and symbolic meanings. The study ensures transparency, reproducibility, and ethical standards, allowing future expansion of research.

Sample and Participants

The research selects 18 households from Ligligkot village, Gorkha, Nepal, as a purposive sample. Seven key informants, including a majority of five men and two women, were chosen for in-depth interviews based on their involvement in community developmental activities. All households that participated in a household survey collected different socio-demographic and economic data. Another method, such as focus group discussions, includes participants of different genders and ages to incorporate various views of climate change.

Instrument and Procedure

The study utilised different procedures, such as household surveys, key informant interviews, and focus group discussions (FDGs), as primary data collection instruments. Household surveys collect socio-demographic and economic data, while interviews and FDGs explore personal views and climate change effects. Data were analysed using quantitative and qualitative techniques (e.g., frequency distributions).

Data Analysis

The research combines qualitative and quantitative data analysis methods. Quantitative data, such as age, sex composition, and land holdings, were analysed using frequency distributions and averages, and other qualitative data were analysed thematically, considering sociocultural and economic contexts, with more emphasis on narratives. A cultural model approach was used to analyse the data, focusing on indigenous knowledge and symbolic sense.

Results

During the conversations with the residents, they mentioned that the village has become warmer compared to earlier periods. In answer, I said that the sun is approaching the earth. However, different people had different explanations for climate and temperature change compared to those in the previous census. One of the elderly women, Ramesh Shrestha (who is 66 years old), described her feelings about the place's warmth:

Time has warmed up more than previously. As opposed to earlier, everything dries sooner. As the temperature rises, insects enter the village. Plants and crops have been bleached. Similarly, crops that were once grown in warmer lowland areas are now

grown in colder mountainous regions, and their typical size has decreased, as has their flavour".

The rhododendron (*Laaligurash*) blooms twice a year; such properties weren't in the past. The flower blooms in *Chaitra* and *Baishak* but does not bloom in *Ashar*. This study implies that locals are responding and seeking changes in their community. The incidence of insects, the production of crops at higher altitudes, altering plant flowering times, and other environmental aspects are all indicators of ecological change. Village people view plants and animals in their local environment to give information on climatic variables. There was dissimilarity in the male and female participants on behalf of climate change. Women hold more in comparison than men to account for economic impacts. This is due to the fact that we were responsible for providing enough nutritious food for our family members. Sometimes, the idea of not being able to feed good food enough to their kids can make them depressed.

Furthermore, the water source provides both irrigated runoff and drinking water. When a new source of drinking water was not discovered, women would walk long distances to the river's area to carry drinking water, which took a long time. In line with Radhika Thapa, *"When I started discussing the changing climate with the older residents of Ligligkot Village, they all responded with "samaya dherae gharo hudai gayo."* Time is becoming more complex, according to the literary meaning of *"samaya dherae gharo hudai gayo."* This means that the crops are ripening more than they would have been in the past, according to the residents of Lingkot. In reference to it, 68-year-old Ashok Shrestha stated,

"In comparison to the past, time has gotten warmer and everything dries sooner. Though they are not as testy as they once were, everything you grow would trip earlier"

Another respondent, Kumari Nepali, 57, claims that

Land productivity has steadily declined due to weather, seasonal, and climatic changes. Additionally, there are record-breaking seasons that affect the production of other types of crops and foods.

Table 1

Distribution Regarding Changing Climate Factors

Climatic Variables	No. of Respondent	Percent (%)
Rainfall has been irregular	21	22.10
Rainfall time has been delayed than before	15	15.78
Almost snowfall has been stopped	28	29.47

Rainfall time has been decreased than before	12	12.63
Direction of rainfall has been changed	19	20
Total	95	100.0

Source: Field survey (2024).

The distribution of 95 respondents with respect to observed changes in climatic variables is shown in the table. The two most frequently reported changes were irregular rainfall patterns (22.10%) and a near-stoppage of snowfall (29.47%). Just 20% of respondents said that rainfall had changed direction, and 15.78% said that rains had been delayed in comparison to prior years. A decrease in the duration of rainfall was the least reported change, as reported by 12.63% of respondents. These results imply that a sizable section of the population in the study area perceives climate irregularities, especially those pertaining to rainfall and snowfall.

Discussion

People's farming practices and routines are closely affected by the differences in agrometeorological variables such as climate, rainfall, and temperature. This result corresponds with previous outcomes of Roncoli et al. (2003) and Vedwan and Rhoades (2001), who highlighted the importance of indigenous knowledge in climatic variation. The sudden outcome of the research was the difference in the blooming pattern of rhododendrons. Flowering occurs twice annually, which was not seen earlier but is considered an important event. This advocates that the native society observes the surrounding change, an event that may be determined systemically and is ignored in wider atmospheric analytics.

Compared with other studies, this research connects local people and the environment, such as Poudel (2012) and Vedwan and Rhoades (2001). The knowledge present in traditional local people and used from generation to generation in the context of climate change supports understanding today's world of the 21st century. This is compatible with the result of Byg and Salick (2009), who find that the traditional knowledge system plays a vital role in analysing environmental factors.

The research indicates that women are responsible for the economic impacts of climate change, especially in the agricultural sector, and food security is not highlighted in the literature. The view of genders in climate change affects community members. Women have tremendous roles in every industry; among them, managing household work and food security are more crucial. This finding is related to research by Sherpa (2014a) on the impacts of climate change on gender in rural Nepal.

Moreover, the findings on irregular rainfall patterns, delayed rainfall, and uneven snowfalls show patterns observed in other studies in the Himalayas, such as those by Rai (2010), who reported

similar climatic changes in the region. These studies prioritise the broader behaviour of climate change impacts, integrating local observations.

This study combines with previous research that neglects the importance of indigenous information and findings in climate change, particularly in backward rural and agricultural communities. The study also highlights the merging of climate change with various sociocultural factors, such as gender, agriculture, and local traditions, which support a deep understanding of the adaptation of rural community's environmental factors. These findings also show the need to incorporate local information into climate change adaptation techniques to address the climate change obstacles in rural areas like Ligligkot.

The field survey consists of a sample population 95, which views that the result is only for the broad population. We cannot entirely rely on such types of research. Moreover, the study focuses on the views of local villagers, so the results could not be wholly accurate or precise. Only the presence of short-term data and the absence of scientific and historical information and data can make it challenging to analyse perceptions of climate change. Due to this, the result is applied to other areas because more studies are required with more considerable and more exact data covering large populations.

Conclusions

In conclusion, this study shows that the people of *Ligligkot* have a higher understanding of climate change and adaptation strategies in the local sector. The research findings depict that the villagers see not only environmental factors as a climate change but also other factors, such as events happening in local sectors such as culture, which are deeply interconnected with local spiritual beliefs and farming practices. It is regarded as accurate that due to climate change, temperature fluctuates daily and shifts in rainfall ratios by either very few or very high. The research emphasises how farming practices, such as agricultural productivity and ways of surviving means of things for subsistence, directly affect changes in untimely rainfall patterns, delayed monsoons, and the nearly total termination of snow in snowfall areas. The study shows how mature inhabitants, among them women, understand climate change more deeply because they are directly in contact with the soil and their roles in food production. It further stated that societies have practised various patterns for dealing with climate change. Among them, diversifications of cropping patterns and sources of income through small enterprises contribute the most. The results focus on the significance of traditional knowledge in understanding the effect of day-changing climate in rural areas, where local knowledge and traditional practices affect how they perceive the environment. The study also deals with the importance of national and international policies in keeping in touch with local inhabitants' information on climate policies and plans. Practically, it is seen that encouraging suitable long-term sustainable farming methods and society-engaging plans can decrease the harmful effects of climate change in countryside areas like *Ligligkot*. Finally, the study focuses more on the traditional knowledge of local people in the context of climate change as rural people provide crucial information through their lifetime experiences for practical and cultural solutions.

Suggestions for Future Research

Based on the discovery of this study, we conclude that the study should focus on a larger population size and belong to a broader territory. It should be simple and consider all aspects. Furthermore, we should include a wide range of scientific data to consider indigenous information and ecosystem views. The research also marks the need for upcoming research to explore particular survival methods such as diversification of agricultural activities and increment of small-scale business to diminish the effect of climate change in rural localities. After more inspection of women and other deprived groups in case of climate change, it gives meaningful results. Eventually, further study should investigate how indigenous knowledge can be considered in plans and policy. Indigenous communities like the rural areas of Ligligkot must integrate into the more exhaustive climatic studies and plan for assessment of further studies.

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Conflicts of Interest

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