

# Climate Change and Adaptation Tries of Marginal Communities: A Case of Chepang and Tamang Communities in Nepal

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## ABSTRACT

**Background:** Climate Change is a serious problem emerging at a global, regional and local level. This study aims to analysis the climate change impact and adaptation measures taken by the Chepang and Tamang communities in Kalika municipality of Chitwan district in Nepal.

**Method:** A cross sectional study design with purposive sampling of two communities Chepang and Tamang interviewed with Focus Group Discussion revealed information related to the Climate change impact and adaptation. The study were carried during March 2025, the interviewed script were processed and analyzed through Qualitative tools NVIVO and KII interview was taken with Local Government of Kalika, Division Forest Office and various stakeholders.

**Result:** The study found that the heat and precipitation patters are changed from normal to erratic rainfall and excessive heat affected local production of the communities. Lack of Production, excessive inputs and improve verities seeds are the ongoing adaptation practices of the surveyed community. Traditional farming and market dependencies have increased due to climate change impact and slowly depletion of local production has now moved to the modern crop system. Low water and weather variation has disturbed the social, economic and cultural practices of the Chepang and Tamang communities.

**Conclusion:** The study concluded as the climate change adversely affected the livelihood of the marginal communities and local adaptation measures are still traditional. A future sustainable development-based farming promotion like plantation of tree and local production enhancement are advised to manage the best sustainable development activities as the best alternative solution of climate change.

**Key words:** climate change; adaptation; livelihood; production; precipitation; pattern.

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## INTRODUCTION

Climate Change is a serious problem emerging at a global, regional and local level. Despite its negligible contribution to total global emissions of greenhouse gases, Nepal is one of the countries that have high risks of contrary effects of climate change.<sup>1</sup> Nepal was Ranke as the 4<sup>th</sup> most vulnerable countries in the world.<sup>2</sup> Various Nepalese studies have found that climate change has adversely affected the temperature, water level change, cold increased and various agriculture productions has decline.

Various diseases, lack of technical extensions and many challenges reported in agriculture, livestock, and forestry sectors respectively.<sup>3</sup> Agriculture stands as the primary employment sector nationwide, employing the majority (67 %) of the economically active part of the population (CBS 2021). Despite its significant contribution, over a one-quarter of the Nepalese population is living in poverty, and nearly 80 percent of workers experience insecure or 'vulnerable' employment situation.<sup>4</sup> Estimates indicate that as much as 90 percent of crop losses in

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Nepal are attributed to weather and climatic events, with approximately 40 percent caused by drought and an additional 23 percent by floods.<sup>5</sup> Droughts and heightened water evaporation, driven by increasing temperatures, are already a reality and are expected to exacerbate, affecting vital streams for irrigation and water availability during the crop growing season. The anticipated rise in temperatures, an increase in wetter days, and prolonged droughts are expected to bring about the emergence of new pests and diseases in crops and livestock. While farmers possess traditional knowledge about existing pests and diseases, they lack experience in dealing with emerging diseases.<sup>5</sup> Presently, the availability of agricultural knowledge and extension services has been inadequate to effectively address these emerging challenges. The adverse effects of climate change on agriculture are poised to escalate household-level food insecurity across all three agro-ecological zones in the country.<sup>6</sup> Subsistence production primarily fulfills household food requirements, but staple crops such as rice, millet and maize, and the livestock are highly susceptible to temperature and rainfall variations. Women, who play a significant role in securing food for the household, are also responsible for caregiving to children and the elderly. Consequently, women, children, and the elderly are found to be disproportionately affected (threatened) by the high potential of future food insecurity.<sup>7</sup>

Nepal is a "multiethnic, multi-lingual, multi-religious, multi-cultural and diverse regional characteristics" country. The country is the homeland to 125 caste/ ethnic groups, 123 languages and 10 religious' groups. (LAHURNIP & NEFIN, 2018). The total population of Nepal is 26,494,50 as per 2011 and nearly 39 billion in 2021.<sup>8,9</sup> The Chepang are an indigenous people in Nepal who live a semi-nomadic existence marked by hunting and gathering, fishing, and swidden agriculture, with some maize and millet terrace cultivation. They face multiple challenges including chronic and widespread food insecurity for half the calendar year and undernutrition in women and children.<sup>10</sup> NCA (2009) also added that the combination of

cereals and legumes along with livestock production improved both the quantity and quality of the food supply for Chepang families, resulting in improved nutritional status among women and children, the most vulnerable groups within the community. The Chepang also saw improvement in the Household Dietary Diversity Index, an indicator of the quality of diet of households. Finally, the lab also contributed to increasing family income in the community from selling agricultural products.<sup>10</sup> Agroforestry is the only sustainable technology adopting by Chepang which is planting in the area since last one decade. The Chiuri known as India Butter tree (*Diploknema butyracea*) are the major initiatives of the Chepang which is culturally attached with the Chepang Community.<sup>11,12</sup> On the Other hand Chepang and tharu are the most primitive indogenous groups of Chitwan residing near to the river basin area, they are hard worket and love to be in nature, pray to nature and do agricultation farming for surviving.<sup>13</sup> Various studies have shown that indogenous people in Chitwan district have adversely affected due to the climate change effect, year after year. The water level in two gigantic river Rapti and Narayani inundated several hectares of land and cut away. Chhetri et al (2022) added that the climate change effects increases the rate of disaster is also increasing year after year that showing the rainfall pattern is eratic and higher compare to many years back, Chepnag and marginal comunties lifes are challenging mananging livelihoods.<sup>12,14</sup>

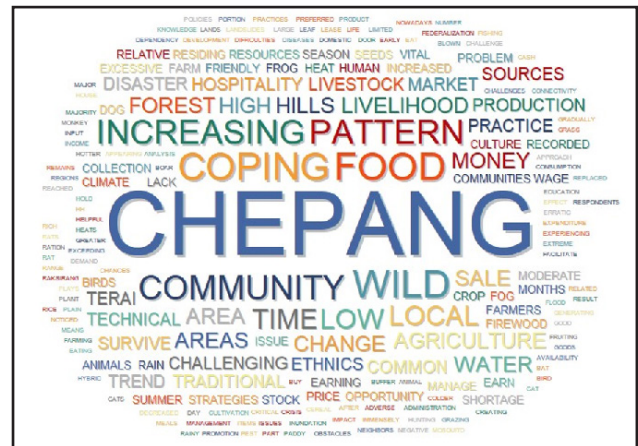
Cheapng and Tamangs marginal of of Dhading, Chitwan and Makwanpur district found with lack of farming practice, disaster, lack of education and inadequate hygine system. Food Security is s aserious concern for people and traditional crop is one of the vital initiatives of the ethnics like Chepang, Tamang, Magar, and Dalit communities.<sup>15</sup> MoALD (2022) report added that maize, millet and Kaguno-Foxtail millet in the Bagamti Province have high potentiality and emerging in the field as this is considered as the most nutritious provide energy and reimbursed desirable farm gate price.<sup>15,16</sup> Thus study shows that farming and other practices are

heavily affected from the climatic effects and local adaptation like agriculture, livestock and forest activities are the best practices using as a part of adaptation in the marginal communities. Thus, this study and its content indicates a study of climate change impact in the present context is essential and ongoing adaptation practices is the best approach to analysis and share among the readers. Thus this study aims to find out climate change impact and adaptation practices of the marginal communities in Nepal.

## METHODS

This is a cross sectional study following qualitative and quantitative analysis. A standard FGD questions has made and tested among the respondents in the study area. Both Chepang and Tamang communities of Kalika Municipality of Chitwan district purposively taken for this study because the majority of Chepang and Tamang are high in the area and both are marginal and residing in the same settlements. The study follows Focus group discussion and four FGD taken in ward no 5 of Padampur settlement Kalika Municipality of Chitwan district in Nepal. The FGD conducted in two places of Padampur and a total of 4 FGD taken and captured the information on which in two group of FGD only Chepang farmers (7 people) allowed to participate and in remaining two FGD team Tamang farmers (7 person) engaged to participate in this study. The FGD formats were transcribed and reviewed and further processed into NVIVO qualitative software that further generates some figure and graphs helps for further explanation. Some Key Informant Interview with Local government, Lead farmers, Teachers, Agriculture Officials of Municipality, agriculture Offices, Division Forest Office and various stake holders working in the field of Climate change were interviewed and all scripts were reviewed, cleaned and illustrated accordingly. Climate change adaptation among marginalized Chepang and Tamang communities in Nepal. Several theories can be relevant to the study: **Sustainable Livelihoods Framework** – Focuses on how climate

change affects livelihoods and what strategies can support long-term sustainability. **Political Ecology Theory** – Examines how environmental changes intersect with socio-political factors, influencing adaptation efforts.



(Source: NVIVO Software processed through FGD data collected in 2025)

**Figure 1. Summary of climate change situation and community experiences.**

## RESULTS

The FGD interview were captured and interpreted through NVIVO qualitative software and summary of elaboration is detail herewith.

Both FGD data and figure-1 illustrated that the major impact of climate change is inadequate rainfall and excessive heat compared to the last five years (2020 to 2025), the temperature has recorded in the nearby school is 40 degree temperature that is 3 degree exceed than last five years. The heat wave is extreme in day time an adversely affected the human and cattles disease. In farming practices excessive heat declined production and pattern of weather is changed from natural to irregular precipitation seasonally. The windblown is adverse, storm is high, rain is erratic and low and during plantation and germination this is difficult to analysis. From the farmers Perspective, Chepang and Tamang both are holding limited land (1 to 5 kattha, upland) only maize and millet production recorded.

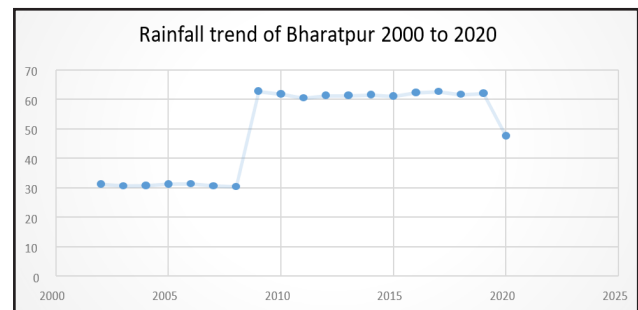
In livestock, the disease increased, goats and poultry are reported low in weight and too many disease lost

the income from livestock sale. In winter season, cold is gradually declining and number of insects like Mosquito, insets and other living animal's nearby forest are growing rapidly. Likewise, Monkey and wild boar is increasing and destroying standing crops affected the overall livelihood of farmers.

Due to changing weather, the income opportunities are limited for both the communities. Likewise, wage and regular farming are the ultimate income of both communities. Climatic variation adversely changes the farming patterns and local verities are no longer exist and farmers in the commercial area using mechanization and wage are limited. Climate change decreased the river and drinking water level this impact the dried land and even for the drinking water farmers taking time to collect and filled the houses demands. The rainfed farmers has no aterationto depends on local farming and rainfall is insufficient. In contrast to the local vegetation, one of the cash crop income also declined due to no more production and excessive heat increased pest and disease as a result of this market needs are not met and local production are limited and community are fully depends on market purchase. From the Disaster view, Terai sectors of study area are highly affected of flood and water level rises and inundation affects the lives of study area. From the Local Government perspectives, lack of human resources in agriculture, forest and other multi sectors are limited and this affecting the lives of farmers. Climatic affect not only exaggerating life also declining skills and level of knowledge of local because both Chepang and Tamang are rich in culture and near to nature. But ongoing climatic affects tradition of Chepang. Localizations of people slightly changed to market purchase and climate change affects supporting market purchase because local production is no longer existing.

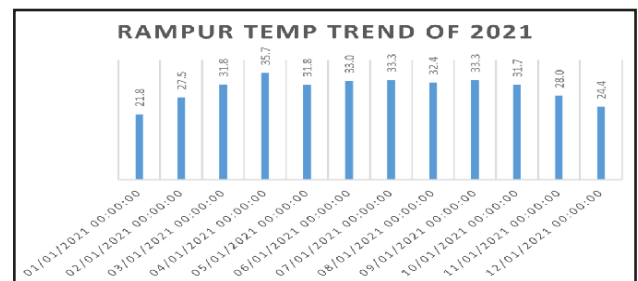
A review of local rain station of Rampur and Bharatpur (Figure-2) also shows that the rainfall trends are chainable and declining trends/ Like in 2001 th eaverage precipitation was 31.16667 has reached to 62.78 in 2009 now again reached in 47.777 in 2020, this is enough to show that the trend

is declining. The trend analysis (figure-2) indicates that the rainfall situation is erratic and difficult to analysis the patterns.



(Source: DHM, 2021)

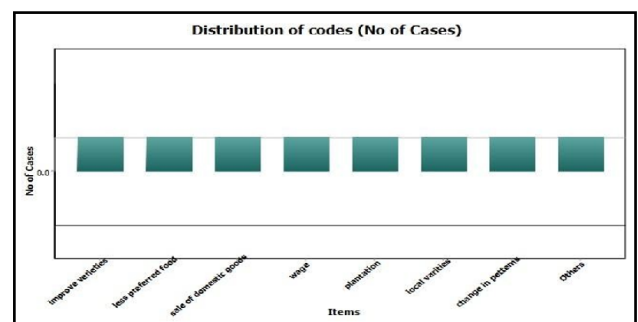
**Figure 2. Rainfall trend of Bharatpur/ Rampur.**



(Source: DHM, 2021)

**Figure 3. Temperature trend analysis of 2021 of Rampur station, Bharatpur.**

Rampur station temperature analysis of 2021 shows tha the average heat recorded during 2021 is 35.7 In summr season and now its has reached to 40 Degree as community responded in the interview, the pattern of heat also changed, the heat in high in the morning and day time as well as in evening times too but in few years ago the heat was little high in day time and now farmers responded that morning field work is also challenging to do.



(Source: NVIVO software)

**Figure 4. Adaptation practices in the study area and possible mitigation during extreme cases.**

## DISCUSSION

From the adaptation perspectives, community strongly added that improve varieties of seeds during maize, millet and paddy are using to increase the production. Chepang and Tamang little changed the practice of traditional farming seed because of limited rainfall and lowering production challenging culture to escape the traditional farming. Excessive inputs like loal and chemical fertilizers, improved varieties of seeds are more in practices. Less preferred food like market purchase and alternative bitten rice and low quality rice and market food are the best food purchasing from the market. Sale of domestic goods like cattle's, crops and legumes are the best adaptation to manage foods and manage livelihoods. Farm and construction wage nearby has increased and people earning an average of 400 to 900 NRS/ day from the various activities. Plantation of trees and local crops are ongoing by the farmers and community as green plantation helps people to manage greeneries. Local tree and farming practices and support by development agencies and Agriculture Ministries/ Units are high and this initiation generating a comprehensive cycle to sustain the farmers life are the best adaptation practice's. In some areas Tamang stated that local varieties of cash crops and legumes are more in plantation to get a quality production and good farm gate prices.

From the adaptation patterns, the change in overall income is the major adaptation recorded like out migration, high value crops plantation, wage opportunity, change of cereal to cash crop plantation and income from the sale of livestock's has changed to market dependencies are the best adaptation practices in the community. Similarly study by Chhetry and Demello (2022) added that the Chepang has changed the farming patterns and agroforestry

plantation and sustainable farming attitudes has developed in some of the Chepang communities, this practices are plantation of banana, broom grasses and pineapples as a part of agriculviculture and pastoral under agroforestry practices.<sup>3</sup>

Thus, the participants added that production enhancement and changing pattern in livelihood are the ultimate adaptation practices recorded closely. Wage, agroforestry practices, plantation and cash crop income and out migration are the ultimate way to manage lives during climate change impact.

## CONCLUSIONS

The study finally concluded as the climate change adversely affected the life of Chepang and Tamang in the study area. Excessive heat, inadequate and insufficient rainfall in partial forms are observed this affected the farming and forest practices of the farmers who fully depends of local resource management. The climate change not only affected the overall weather also increased disease and pest that lowering the production and generates numerous problems of insects and disease. The management of local water level sources are down and disaster is increasing that anticipating negative adaptation to manage for some time but for the long-term sustainable practices community need to plan for a long term strategies and this is advices to manage local resource and manage accordingly. Production enhancement and management of traditional crops and other forest product can manage, sustained and manage the cultural management of Chepang and Tamang community.

**Conflict of Interest:** None

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