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The Impact of Climate Change on Livestock in the Uttarakhand Himalayan Region

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ABSTRACT

Climate change is significantly impacting livestock farming in the Uttarakhand Himalayan region, threatening the environment and local farmers' livelihoods. This study examines how climate change affects livestock, focusing on shifting seasonal patterns, heat stress, water scarcity, rising disease outbreaks, and the threat to indigenous livestock breeds. As temperatures rise, traditional grazing areas become less viable, and farmers face increased challenges from extreme weather events, reduced water availability, and the spread of livestock diseases. These climate-induced changes are reducing productivity and increasing economic instability for small-scale farmers. The study highlights the importance of adaptive strategies such as adjusting grazing patterns, promoting climate-resilient livestock breeds, improving water management, and diversifying livelihoods to mitigate the adverse effects. Through proactive adaptation and sustainable farming practices, the region's livestock sector can better cope with these challenges, ensuring the future of livestock farming in Uttarakhand.

Keywords: *Climate change, livestock farming, Uttarakhand, heat stress, grazing patterns, water scarcity, adaptation strategies, economic impacts*

Introduction

The picturesque biodiversity of the Himalayas is represented in the Uttarakhand region and serves as home to many different livestock species that are the foundations of its economy. Uttarakhand is renowned for its stunning landscapes and is often called "Devbhoomi" due to its numerous temples, shrines, and places dedicated to worship and meditation. The state falls under National Agroclimatic Zones No. 9 and 14. Uttarakhand boasts diverse livestock, including cattle, buffalo, goats, sheep, pigs, horses, ponies, mules, and poultry. A key characteristic of animal husbandry in the state is its large livestock population, though productivity tends to be low. Livestock holdings per household are small and often involve a mix of species. The tribal communities, particularly the Gujjars, are known for raising large numbers of buffalo and sheep (Tuteja, 2013). Rearing livestock has always been the occupation of the natives of this region. However, with climate changes, this practice is bound to be affected throughout and is likely to have consequences for both the livestock and the farmers growing them.The Himalayas of Uttarakhand represent a unique agro-ecological zone where livestock rearing is an intrinsic part of rural livelihoods, particularly among the Bhotiya tribes inhabiting the high-altitude valleys of Johar, Byans, Niti, and Bhagirathi. However, changing climatic conditions—manifested through rising temperatures, erratic precipitation, shorter winters, and decreased snowfall—have begun to drastically alter the delicate balance of livestock-based livelihoods in this region (Rautela & Karki, 2015).

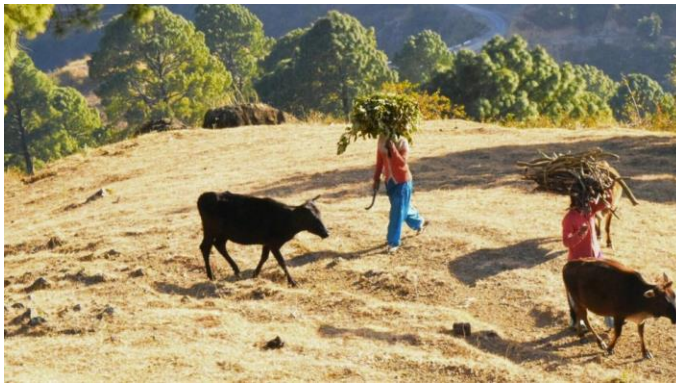
Climatic Trends and Perceptions

Based on community observations:

- 86% of respondents noted a clear increase in average temperatures.
- 70% observed a shift in precipitation from snow to rain.
- 89% reported that winters have become significantly shorter.
- 90% observed phenological changes in flowering and fruiting seasons. These shifts have had cascading effects on forest regeneration, fodder availability, and seasonal migration patterns critical to livestock management (Rautela & Karki, 2015).

Livestock Rearing Systems and Traditional Practices The livestock systems in these high-altitude regions rely on (Rawat & Schickhoff, 2022).:

- Seasonal migration to alpine meadows (*bugyals*) in summer.
- Free grazing in forest and common lands.
- Diverse livestock including cows, buffaloes, sheep, goats, and yaks (in higher altitudes). Households maintain small mixed herds (5–6 animals), while nomadic tribes manage larger herds (up to 1000 head of sheep/goats). This system is finely tuned to seasonal availability of grass and fodder



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1. Shifting Seasons and Changing Grazing Patterns

One of the most noticeable effects of climate change in Uttarakhand is the shifting of seasonal patterns. Winters are becoming shorter and warmer, with reduced snowfall and earlier snowmelt. In a region where alpine pastures provide vital grazing grounds for livestock, the shortening of the snow-covered period affects the availability of these pastures. As the snow melts earlier, the grazing grounds that livestock rely on during summer are no longer available when needed. This mismatch between grazing seasons and livestock needs results in overgrazing in certain areas or a shortage of pasture in others, posing a challenge for farmers who rely on these natural resources (Sati, 2016).

2. Heat Stress and Its Consequences

Higher temperatures are another prominent consequence of climate change in the region. Livestock such as cattle, goats, and sheep are particularly vulnerable to heat stress, which can have multiple adverse effects. Prolonged exposure to excessive heat can reduce milk yields, slow animal growth, and even lead to higher mortality rates. Additionally, heat stress increases the animals' vulnerability to dehydration, parasitic infections, and pests. This threatens the livestock's health and undermines the economic stability of the farming households that depend on these animals for their livelihoods.

3. Water Scarcity: A Growing Concern

Water scarcity is becoming an increasingly pressing issue as climate change alters precipitation patterns and disrupts traditional water sources. Uttarakhand is home to numerous rivers, streams, and springs traditionally relied upon for human and animal consumption. However, many of these water sources are drying up or becoming unreliable with the changing climate. Reduced rainfall and early snowmelt further exacerbate this problem, leaving farmers and livestock without a consistent and reliable water supply. This water scarcity also affects the cultivation of fodder crops, which are essential for feeding livestock during periods when grazing is impossible, thereby compounding farmers' challenges.

4. Rising Risk of Disease Outbreaks

Higher temperatures, increased humidity, and changes in precipitation create the ideal conditions for spreading diseases that affect livestock. Diseases such as foot-and-mouth disease, tick-borne infections, and other parasitic infestations become more prevalent in warmer, wetter climates. Additionally, climate-induced stress can weaken the immune systems of livestock, making them more susceptible to infections and reducing their overall health. If not properly managed, these health concerns can lead to significant economic losses for farmers, who may face higher veterinary costs, lower productivity, or the loss of valuable animals.

5. Threat to Indigenous Livestock Breeds

Uttarakhand is home to several indigenous breeds of livestock, such as the Garhwali goat and the hill cattle, which are uniquely adapted to the region's harsh climatic conditions. These breeds have evolved over centuries to withstand the Himalayas' cold temperatures, rugged terrain, and scarce resources. However, the rapid pace of climate change is threatening their survival. Warmer temperatures, reduced pasture availability, and increased disease risk pose serious challenges to these native breeds. Farmers may be tempted to crossbreed these animals with more commercially viable or climate-resilient breeds, potentially losing genetic diversity and traditional knowledge.

6. Economic Impacts on Livelihoods

For the people of Uttarakhand, livestock farming is a primary source of income. The changing climate is disrupting this income stream in several ways. Reduced productivity due to heat stress, disease outbreaks, and grazing scarcity means that farmers are seeing lower yields of milk, wool, and meat. Additionally, the increasing costs of water and feed, as well as the disruption of traditional grazing patterns, further strain the economic stability of farming households. The impact of climate change is especially acute for small-scale farmers who lack the resources to adapt to these changes and may struggle to cover the rising costs of maintaining their livestock (Bhatt, 2021).

7. Extreme Weather Events and Natural Disasters

In recent years, Uttarakhand has witnessed a rise in extreme weather events such as heavy rainfall, floods, and landslides. These events cause immediate harm to livestock and disrupt transportation routes, making it difficult for farmers to access markets and sell their animals or purchase feed. Additionally, extreme weather events such as floods can lead to the loss of grazing land and cause soil erosion, further reducing the availability of resources for livestock.

Mitigation and Adaptation Strategies

Despite the challenges posed by climate change, there are several ways to mitigate its impact on livestock farming in Uttarakhand. Some of the key strategies include:

- **Adjusting Grazing Patterns**: Farmers may need to adapt by shifting grazing areas or adjusting the timing of livestock movements to align with changing seasonal conditions. This could involve moving livestock to higher elevations earlier in the summer or finding alternative grazing areas that remain viable for longer.
- **Improved Livestock Management**: Providing farmers with training on heat stress prevention, disease control, and water management can help improve livestock health and productivity. Simple measures such as providing shade, cooling systems, or proper hydration can significantly affect animal well-being.
- **Breeding Resilient Livestock**: Promoting climate-resilient breeds or crossbreeds that are better equipped to withstand heat stress and disease could help safeguard livestock populations. However, this should be done carefully to avoid the loss of indigenous breeds.
- **Diversifying Livelihoods**: Encouraging farmers to diversify their income sources can reduce their dependence on livestock alone. Agroforestry, eco-tourism, and sustainable farming practices can provide additional sources of revenue and reduce the economic risks associated with climate change.

- **Water Conservation and Management**: Building rainwater harvesting systems and improving irrigation infrastructure can help ensure a consistent water supply for both livestock and crops. Community-based water management initiatives can also play a key role in enhancing water security.

4. Impact of Climate Change on Fodder and Grazing

a. Decline in Forest-Based Fodder:

- 61% of respondents noted forest degradation due to fire, road construction, and overgrazing.
- Reduced snowfall affects the regeneration of broad-leaf species like oak (*Quercus spp.*), which provide fodder and leaf litter.
- Oak forests, critical for fodder and water recharge, are declining due to climate-induced factors and human activities.

b. Pasture Degradation:

- High-altitude pastures are drying up faster in warmer, drier summers.
- Productivity of pastures has decreased, leading to overuse and degradation.
- Earlier snowmelt alters the timing of grazing, stressing both pastures and livestock.

c. Water Scarcity:

- 92% of respondents reported fluctuating water availability.
- Springs and streams that provide water for animals are drying up due to glacier retreat and rainfall variability.

5. Increased Livestock Vulnerability

a. Health and Nutrition:

- Reduced availability of nutritious grass leads to poorer livestock health.
- Less snow cover means more exposure to pests and diseases.
- Decline in leaf litter impacts traditional bedding for livestock, increasing risk of infection.

b. Conflict with Wildlife:

- 68% of respondents observed increased wild animal activity near villages.
- Leopards, bears, and wild boars are attacking livestock due to food scarcity in forests.
- Animals like Himalayan black bear and monkeys are now more aggressive and fearless of human presence.

c. Work Burden:

- Women and children spend more time collecting fodder and water.
- Families are forced to reduce herd sizes or switch to smaller animals like goats and poultry.

Conclusion

Climate change poses a serious threat to the livestock sector in Uttarakhand, affecting both the environment and the livelihoods of local farmers. However, with proactive adaptation strategies, including changes in grazing practices, improved livestock management, and the promotion of resilient breeds, the region's livestock sector can better cope with the challenges ahead. By supporting sustainable farming practices and providing farmers with the necessary tools and knowledge, it is possible to safeguard the future of livestock farming in the Uttarakhand Himalayan region.

References:

1. Bhatt, H. C. (2021). Agriculture vs. Livestock: A Study of Kumoun Region of Uttarakhand. *Journal of Entrepreneurship and Management*, *10*(1), 18.
2. ImageSource: https://www.villagesquare.in/whats-curdling-the-milk-in-uttarakhand/
3. Panda, A., Gupta, T., & Gupta, A. K. (2024). Insight for Climate Resilience and District Level Developmental Planning for Disaster Risk Reduction in Himalayas: A Case of Uttarakhand. In *Disaster Risk and Management Under Climate*

Change (pp. 499-515). Singapore: Springer Nature Singapore.

4. Raghuvanshi, R., & Ansari, M. A. (2020). Farmers' vulnerability to climate change: A study in North Himalayan region of Uttarakhand, India. *Indian Journal of Extension Education*, *56*(4), 1-8.
5. Rawat, D., & Schickhoff, U. (2022). Changing climate scenario in high altitude regions: comparison of observed trends and perceptions of agro-pastoralists in Darma Valley, Uttarakhand, India. *Mountain Landscapes in Transition: Effects of Land Use and Climate Change*, 429-447.
6. Sati, V. P. (2016). Livestock farming in the Uttarakhand Himalaya, India: use pattern and potentiality. *Current Science*, 1955-1960.
7. Tuteja, U. (2013). Agriculture profile of Uttarakhand. *Agricultural Economics Research Centre University of Delhi*, 1-12.
8. Rautela, P. & Karki, B. (2015). *Impact of Climate Change on Life and Livelihood of Indigenous People of Higher Himalaya in Uttarakhand, India*. American Journal of Environmental Protection, 3(4), 112–124. doi:10.12691/env-3-4-2