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Farming Inequality in a Changing Climate

Rakhi Solanki[1]*, Gaurav Singhal[2]

1 Research Scholar, Vikrant University, Gwalior, M.P. India

rakhesolankii@ gmail. com

2 Associate Professor, School of Humanities and Culture, Vikrant University, Gwalior, M.P. India

Abstract: Climate change has become a lived reality for mountain communities in Uttarakhand, India, where temperatures are rising, rainfall is unpredictable, forest fires are common, and pest assaults are on the rise, climate change is changing the way people in mountain communities make a living. This article talks about how climate change affects marginal and small-scale farmers more than other types of farmers. It focusses on Dalit women, who are more vulnerable because of caste prejudice, gender inequality, limited property ownership, and lack of access to resources. Using examples from communities like Dhudholi and Chinoni, the article shows how disparities in opportunity for land, technological advances, sustainable crops, internet access, and government welfare programs makes it harder to adapt. State-led and non-governmental programs advocate for climate-resilient techniques, including diversification of crops, organic farming, and horticulture. However, these solutions frequently remain unattainable for the poorest farmers due to elevated costs, protracted returns, and bureaucratic obstacles. The paper contends that changing the climate in Uttarakhand is not merely an ecological emergency but also a human rights concern that jeopardises availability of food, job opportunities, and the dignity of underprivileged groups. It ends by stressing the importance of climate policies that are inclusive, take caste and gender into account, and put access, affordability, and local realities first in order to create a truly resilient cropping future.

Keywords: Climate Change; Uttarakhand; Dalit Women; Small and Marginal Farmers; Gender Inequality; Agriculture; Land Ownership; Social Inequality ;Climate Vulnerability

INTRODUCTION

Climate change is no longer an abstract or distant worry for India's hill villages. In Uttarakhand, a state in the Himalayas, daily life is changing because of rising temperatures, unpredictable rainfall, forest fires, and more pest attacks. These changes in the environment are not just bad for the environment; they are also very bad for the people who live there, especially women and Dalit groups who are smallholder farmers. Climate change affects caste, gender, poverty, and land ownership, making already vulnerable groups even more so.

This essay focusses on Dalit women and looks at how climate change has affected small and marginal farmers in Uttarakhand. It shows how hard it is to adapt when people don't have equal access to land, resources, information, and government help, using real examples from

villages like Dhudholi and Chinoni. The government and non-governmental organisations (NGOs) may support farming practices that can withstand climate change, but the poorest farmers often can't afford these solutions. Climate change could put an end to years of slow social and economic progress.

Small landholdings and climate vulnerability

Uttarakhand is mostly mountainous, so farming is hard because of steep slopes, fragile soils, and not enough water for irrigation. The 2011 agricultural census says that most of the state's cropland is made up of small and marginal holdings. Marginal farms (less than one hectare) make up about 36% of all cultivated land, and small farms (between one and two hectares) make up another 28%. Small landholdings make it hard for farmers to buy new technology, grow different kinds of crops, and recover from losses due to bad weather. For women like Kamla Devi and Vimla Devi from one of the small village of Uttarakhand, farming is more about staying alive than making money. They manually thresh wheat in a neighbour's yard after the harvest in exchange for food for their animals. They can't grow enough food on their own land. Households may go hungry or get into debt after just one season of crop failure because they don't have enough money. Climate change has made these risks worse. The Himalayas are warming up faster than the rest of the world, which affects growing seasons, farming cycles, and the amount of moisture in the soil. Crops that used to be reliable are now stressed out by heat, rain that comes and goes, and changing seasons. Farmers with bigger farms can sometimes make up for losses with savings or other sources of income. For marginal farmers, there is no such safety net.

Land Ownership, Caste, and Historical Inequality

Farmers are affected by climate change in many ways. Land ownership in Uttarakhand shows how society has changed over time. Studies show that small and marginal farmers come from all walks of life, but Scheduled Castes, also known as Dalits, rarely own large amounts of land (more than four hectares). This trend happened because Dalits couldn't get jobs, go to school, or buy land because they were oppressed in the past.

Even though India has made a lot of progress since it became independent, Dalit communities are still on the outside, as shown by the small amount of land they own. Neema Devi and Prema Devi, like many other people in the Dalit community, work small plots that barely feed their families. Climate change is threatening even this fragile stability. Dalit farmers have

fewer choices than wealthier or higher-caste farmers when it doesn't rain or forest fires damage crops. Also, Dalit communities are often found outside of villages. This spatial separation makes them more vulnerable to climate effects like wildlife invasion and poor infrastructure. Poor roads and drainage make the effects of too much rain worse, and fields that are closer to forests are more likely to have wild animals escape from forest fires.

Crop Change: Some People Change, But Not Everyone Does

As traditional crops become less reliable, some farmers in Uttarakhand are trying out new crops that can withstand climate change. With help from the government or non-governmental organisations, they are switching to high-value herbs and medicinal plants or fruits like kiwis. But small and marginal farmers can't afford these changes because they sometimes need a lot of money up front.

According to the Indian Development Report published in July 2025, the Uttarakhand government gives money to help kiwi plants grow as part of its plan to deal with climate change. Growing kiwis can be profitable, but it needs expensive infrastructure. Each plant needs a T-shaped angle iron support system that costs between INR 4,000 and 5,000. You can only grow about eight kiwi plants on one nali of land, which is 0.049 acres. This means that the cost of support structures alone, not including people, transportation, or fertiliser, can be close to INR 40,000.

A small farmer who makes less than the state average can't afford to make such an investment. Also, it takes three to five years for kiwi bushes to bear fruit, and during that time, farmers must find a way to make ends meet without any money.

The problems with growing medicinal herbs and crops are the same. People often try to sell lemongrass and tulsi (holy basil) as profitable alternatives. But selling raw leaves doesn't make much money, and getting essential oils out of them requires a lot of product and special equipment. To make 100 millilitres of lemongrass oil, for example, you need to grow at least one metric tonne of plant material over a large area. Dalits, women, and poor farmers rarely have access to such land or processing facilities.

Organic Farming and Problems That Aren't Talked About

The Uttarakhand government and non-governmental organisations support organic farming as another way to help the climate stay strong. Native crops like barnyard millet and finger millet

are better able to deal with mildew, pests, and rain that comes at odd times. They are also good for farming in the highlands because they need less water.

The Uttarakhand State Organic Certification Agency (USOCA) was set up to help make this change happen. On paper, its policies don't seem to be discriminatory. But in reality, many small-scale farmers don't have the resources they need to farm organically. Cow dung and compost are common ingredients in organic fertilisers, but many Dalit people don't have the animals they need to get these things. “Many Dalit families don't even have enough livestock to make cow dung fertiliser," says Geeta Bisht, an agriculture expert at the Institute of Himalayan Environmental Research and Education (INHERE). Low-income families who want to do low-input farming cannot do so because it costs more to buy organic inputs from the market.

Loss of crops and uncertainty about when it will rain

One of the most direct effects of climate change in Uttarakhand is that rain falls at random times. Most farmers in the state depend on the monsoon because only about 45% of their land is watered. Kheema, a field coordinator for the Association for Rural Planning and Action (ARPAN), says that rain either comes in huge amounts or at the wrong time right now.

Basanti Devi, who lives in Chinoni village, remembers how too much rain hurt her wheat crop during harvest time. Rain ruined what could be saved and washed away the grains. Wheat that gets wet often turns black or sprouts, which makes it unsafe for people to eat. Families that grow wheat mostly for their own food security are hit hard by these kinds of losses.

Kamla Devi and Vimla Devi only grow wheat for their own use, but they also make money from fruit trees that grow peaches, plums, oranges, and lemons. The rain this year came at the wrong time and ruined fruit and flowers, which hurt their business.

Digital Exclusion and Lack of Information

To adapt to climate change, you need to be able to get information. Some farmers learn about government programs, subsidies, and weather forecasts through WhatsApp groups run by NGOs. But many farmers with low incomes can't afford to get online or buy smartphones. They say that by the time information gets to her neighbourhood, the deadlines have passed or the resources have been sent somewhere else. This digital divide keeps the most disadvantaged

farmers from getting help from networks that are meant to help them, which makes the gaps that already exist even bigger.

Problems with owning land and getting crop insurance

The Indian government has started crop insurance programs like the Pradhan Mantri Fasal Bima Yojana to help farmers deal with the losses caused by climate change. But in mountainous states like Uttarakhand, these plans often don't consider the specific needs of the area. A lot of Dalit women and farmers work on land that isn't theirs by law. Some people are allowed to keep all of the harvest in exchange for taking care of the land, while others share their profits with landlords who don't live there. Crop insurance won't pay these farmers because they don't own the land. Because of warmer temperatures, more plants are getting sick and more pests are invading farms. As a result, farmers have to pay more for pesticides. People who grow crops on someone else's land have to pay for all of these costs out of their own pockets, which makes their already low wages even lower.

Fires in the woods and fights between people and animals

Forest fires are another growing threat in Uttarakhand. In the last 20 years, there have been a lot more fires, which is directly linked to the rise in temperatures. Fires drive wild animals like monkeys and wild boars into farms, which is bad for small farmers who live near woods. Sometimes animals destroying crops overnight makes families poor. Most of these attacks are against Dalit people, who often live on the outskirts of villages near woods. Without fences, compensation, or good wildlife control, farmers can't do anything.

Neglect of the environment and damage to infrastructure

Periods of heavy rain have also hurt infrastructure and farmland. Heavy rains caused landslides and floods in Uttarakhand in 2021. The damage was made worse by the fact that the drainage systems weren't good enough. Vimla Devi lost about 1,000 square feet of farmland when drainage from a nearby highway washed away her fields. These grounds used to have fruit trees and vegetable crops on them. Now they are sterile. These losses show that poorly planned development projects can make climate change's effects on communities that are already at risk even worse.

Migration, Gender, and Bureaucratic Barriers

Gender inequality makes it harder to adapt to climate change. Many men from Uttarakhand go to cities to find work, leaving women to take care of the house and the fields. Women play a very important role in farming, but they often don't have enough education, land titles, or experience with government processes. Farmers must go to block offices, which are often far from where they live, to get paperwork for government programs. Women don't apply because they don't have enough time, can't afford to travel, and work in offices that are run by men.

CONCLUSION

Farmers in Uttarakhand say that climate change does not affect everyone equally, regardless of their caste or gender. Its effects are affected by things like social exclusion, patterns of property ownership, and past wrongs. A lot of the time, NGO projects and government programs that try to make people more resilient to climate change don't reach the people who need them the most.

Climate change threatens not only crops but also the dignity, food security, and hard-won social progress of Dalit women farmers such as Neema Devi, Prema Devi, and Rama Devi. We need more than just technology to solve these problems. It requires inclusive policies that recognise the realities of poverty, gender, and caste, ensuring that adaptation strategies are equitable, accessible, and affordable.

Uttarakhand cannot hope to build a truly strong agricultural future unless it puts climate policy at the centre of its plans for farmers who are already struggling.

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