Tribal Adaptation to Climate Change among the Hill Dwellers of Himachal Pradesh

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Abstract

Because of their unique socio-economic, cultural, and ecological contexts, farmers may be seen as agents of change within the human component of agricultural adaptation. Farmers' perspectives on climate change are examined through the lens of their prior exposure to and comfort with risk and uncertainty. Farmers hone their adaptability and use appropriate local adaptation measures as a result. How farmers see the short-term and long-term risks associated with climate change affects the tactics they use to adapt. Micro-level connections between agents, the institutions wherein they participate, and the supply line upon which they rely are all part of the adaptation process. It is, therefore, crucial to comprehend how farmers participate in the decision-making process, as well as the major elements that generate and increase adaptation responses.

Keywords: Perception, adaptation, micro-level, strategies, Himachal.

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Introduction

Temperature and precipitation increases and decreases, regional monsoon fluctuations, and local occurrences of climate extremes are all examples of climatic influences (e.g., flood, drought, cyclones, and frosts). Short-term, irregular, and uncertain temperature and climatic dramatic fluctuations between years are the norm. Seasonal climate predictions have long been a source of anxiety for farmers due to the short window of opportunity they provide for effective action.

Farmers' cognitive abilities vary by household and are affected by age, education, gender, geography, ethnicity, and socioeconomic status, all of which affect the farmers' capacity to adapt. Family size, age, gender, level of education, and farm size are only few of the socioeconomic and demographic elements that affect Tribal-households' adaptive potential.

Several studies have shown that higher levels of education improve Tribal people's understanding of climate change and their propensity to implement mitigation solutions. Family size is a crucial factor in determining the viability of implementing a new adaptive response on the farm. The average size of the households in the study was 9. There must be a minimum of 3 people and a maximum of 20 people per family. A larger family is likely to have a more favorable effect on their adoption choice.

Females and children under the age of 10 make up half of the typical dependant population, which totals five people. The group's ability to adapt may benefit or suffer depending on the amount of people that rely on them.

Adapting to Climate Change

Choices and decisions about adaptation are also strongly influenced by the main and secondary vocational composition of the family. Researchers found that few farmers in the survey had ever worked in a non-climate-sensitive profession. Income diversification, which is facilitated by the secondary employment, is thought to increase resilience.

The impacts of climatic extremes (flood, drought, cyclone, cold, and severe heat) on the Tribal peoples have been documented in five separate climate Change impact categories: no effect, low impact, medium impact, high impact, and extremely high impact. The preceding five years, ten years, fifteen years, and twenty years were each characterized by their own unique set of climatic extremes. According to the findings, the majority of the farmers who were polled had experienced both flooding (85%) and frost occurrences (76%). The cyclone struck farmers somewhat often (60%), and so did the heat (45%). Yet, throughout that time frame (the preceding 20 years), farmers had 'minimal' exposure to drought, cyclone, cold, and heat. These findings are indicative of the Tribes' capacity for long-term memory retention.

Extreme Fall Out of Climate Change Due to its frequency, flooding was by far the most common climatic extreme in the region examined (Jha and Gundimeda. 2019). The farmers agreed that their long-term experiences were either high or extremely high (for the past 20 years). Increased rainfall and problems with development and infrastructure in the State of Bihar contribute to more severe and frequent floods in the survey region.

As most farming relies on natural precipitation, it stands to reason that rising temperatures and more frequent downpours would increase the efficiency of irrigation systems. Kharif season is characterized by the cultivation of rice and maize, whereas Rabi season is characterized by the cultivation of. Since the monsoon rains end in September and October, farmers have to adjust more during the Rabi season.

The shift in rainfall patterns is the primary driver of the increased usage of irrigation to counter climate change. When typical rain is delayed, the tribes must begin cultivating their crops using the irrigation system. The farmer's lack of faith in adjusting the planting schedule likely plays a role in this.

Soil Conservation in The Indian Himalayas

One of the most significant soil conservation measures that relies on seasonal weather forecasts is changing the area under cultivation and rotating the land. Insurance purchase, soil protection, and water conservation are examples of knowledge- and innovation adaptation techniques that are underused in the study area because of a lack of knowledge and understanding among farm families.

The obstacle of adaptation is the absence to institutional framework to increase awareness and provide greater understanding of these solutions. Due to the small size of the land holding, the potential benefits of alternative diversification options, such as growing vegetables, horticulture, or converting agricultural land to non-farm use, are likewise minimal.

Most indigenous people have deep emotional roots in their traditional agricultural practices and may be reluctant to change. The research found that young growers are more likely to adopt experience and understanding adaptation options like water and soil conservation efforts, insurance, revenue and sustainable livelihoods strategies, and crop diversification strategies like the plantation of horticulture as well as vegetables during the summer and winter growing seasons in response to unexpected changes in climatic variations.

Young tribe members are more likely to take chances than more seasoned farmers, which is a major factor (Adesina and Zinnah 1993). It was discovered that farmers' confidence in the latest tech was increased by the presence of insurance coverage (Wang et al., 2013). The likelihood of adopting adaptive techniques was shown to be significantly influenced by gender in both seasons.

The research concludes that migrant farm families are in the best position to embrace numerous adaptation techniques and have the greatest potential to adopt adaptation strategies that require substantial investment of knowledge, money, and resources. The majority of Tribals in the study area and India are smallholders, therefore income guarantee may be an effective method to provide tribals with a feeling of security by meeting some of their consumption and spending requirements. This research suggests that in order to provide a stable income, non-climate sensitive local livelihood choices should be made available in addition to farm-level adaption options.

Challenges of Conserving Water

Water resource challenges have not been sufficiently addressed in climate change analysis and climate policy formulations, according to the Intergovernmental Panel on Climate Change (IPCC). Similarly, analysis, management, and policy development pertaining to water resources have, for the most part, failed to appropriately address the challenges posed by climate change.

Several scientists predict that the quantity and quality of water will be the most significant stresses on communities and the environment as a result of climate change, highlighting the need of better comprehending the difficulties and interconnections at play.

In the Himalayan state of Himachal Pradesh, researchers surveyed agricultural households to learn more about locals' reactions to and strategies for dealing with climate change and unpredictability. According to the study's findings, 88.9% of respondents saw an increase in regional temperatures, while 88.4% noticed a decline in rainfall. Maximum temperature and rainfall expectations were consistent with findings from a linear regression analysis of data from a regional meteorological station for the period 1995-2011.

People in the central highlands have begun adapting to climate change by switching to other crops, cultivars, early planting, and other cultural techniques in response to increasing temperatures and diminishing, unpredictable rainfall. The primary obstacles to adaptations in the area were a lack of expertise on adaptation methods, a lack of access to early warning information, the inaccuracy of seasonal forecasts, and the high cost of adaption. The research also found that characteristics including the education level of the household head, the length of time spent farming, income from sources other than farming, access to finance, and extension services all contribute to a greater ability to adapt to climate change.

The economy of the Western Himalayas is highly dependent on climate-sensitive natural resources, and this dependency has made the area vulnerable to the effects of climatic fluctuation and change. Almost 80% of farmers in Himachal Pradesh, for instance, depend on rain fed farming, making them especially vulnerable to the risks and vicissitudes of climate and other environmental factors. Moreover, the development operations that dominate in the mid hill area of Himachal Pradesh disregard the imperatives of mountain specificities, making the region fragile and ecologically sensitive. Rainfall is predicted to shift, temperatures will rise, causing higher evaporation rates, and floods will occur in the area. This, in turn, will increase soil degradation, disease spread, and the depletion of both surface and ground water supplies.

Barriers to Adaptation to Climate Change

The adaptation to climate change was considered as difficult in the middle hills of Himachal Pradesh due to the high expenses associated with doing so. Next, respondents cited a lack of knowledge on adaption measures (93.8 percent), early warning information (87.2 percent), the inaccuracy of seasonal prediction (88 percent), access to technology (88.1%), a paucity of manpower (72 percent), a mountainous inclines (79.9 percent), and a shortage of communication infrastructure (65percent). Similarly, 34 percent of respondents cited insufficient water supplies. Lack of agricultural extension (47.4 percent), improved crop/seed (50 percent) and irrigation projects (21 percent) are all factors that prevent adaptation from happening.

According to the statistics, there are three types of obstacles to adaptation in the region: (i) individual, (ii) institutional, and (iii) technology. It was found that the region's educated population adapted better than its less-informed counterpart. It was also shown that individuals with higher incomes were more flexible than those with lower incomes.

Adoption of adaption strategies is also strongly influenced by institutional variables including access to extension services and information source as well as access to institutional finance.

Mountains are rich in biodiversity and offer much-needed ecosystem services that are essential to human well-being yet are often taken for granted. Water quality, food security, and flood protection are just a few of the many things that rely on them. They are also the basis for the natural processes that regulate the climate. Yet, the long-term supply of ecosystem goods and services from mountain ecosystems is threatened by climate change and unpredictability, highlighting the critical need for those who solely depend on them for their livelihoods, notably farmers, to devise adaptation strategies.

Adaptation Strategies of Tribals

Tribals adapt to climate change after seeing changes and determining which ones would be beneficial (Maddison, 2006). Options for agricultural adaptation include several levels of organization (local, regional, and global) (farmers, firms, government). Adapting to a changing environment requires both micro- and macro-level actions, such as modifying the crops grown and the time of activities, as well as market responses like diversified income and credit schemes and institutional modifications.

Technological innovations, including the creation and marketing of new crop types and advances in water management methods, as well as government actions like the elimination of preservation subsidies and enhancements to agricultural markets, are enabling farmers to adapt to such changes but the tribals are lagging far behind (Mendelsohn, 2001; Smit and Skinner, 2002; Kurukulasuriya and Rosenthal, 2003).

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“Several employees in the northwestern Himalayan area have observed considerable increases in maximum, minimum, and mean annual air temperatures” (Vidya et al., 2015). Almost 68% of India's landmass has had less precipitation in the past century, according to studies (Kumar et al. 2006). The agricultural system in the Himalayan foothills has been devastated by climate change and unpredictability, particularly the erratic distribution of rain (Bhardwaj et al., 2010).

Changed Socio-economic Situations in Himachal Pradesh

In addition, the midhills of Himachal Pradesh have seen a steady rise in the socio-economic and biophysical consequences of climate-related hazards such floods, droughts, unpredictable rainfall, pests and diseases, hailstorms, and landslides. Farmers have little adaptive ability, yet they have survived and thrived by adopting a variety of tactical solutions (adaptations).

Recognizing and recording local adaptation tactics is a crucial first step toward bolstering local people's resistance to climate change, but until now, these adaptations have not been appreciated or recorded. As a result, it is crucial to analyze local adaptation in order to guide policy for future effective adaptation of the agricultural sector to the effects of climate change. This research aimed to evaluate the elements that drive farmers' adaptation and the specific adaptation tactics they've used on their farms. Research participants were asked about their familiarity with and thoughts on climate variability and change, as well as the sorts of adaptation methods they had considered and the variables that influenced their choice of those strategies.

There are 60 percent of tribals have opted for early maturing crops, 4.2 percent have constructed water collecting systems, 20 percent have increased irrigation, 60 percent have shifted when they plant, 53 percent use mixed cropping, and 23 percent have adopted soil conservation practices. While farmers have started growing drought-resistant crops (32.5%), tribals are now keeping a more diverse range of crops and animals (32.8%), shifting their focus from rearing animals (4.9%), to crops animals (5.6%). It's interesting to observe how perceptions of shifting rainfall patterns lead to adaptations that are distinct from those prompted by rising or falling temperatures. Although most people who face the consequences of rising temperatures do so by switching to a more heat-tolerant crop variety, many people who face the effects of declining precipitation do so by constructing water-harvesting techniques.

Conclusion

Research on how farmers feel about climate change has shown that the middle of the Himalayas has gotten warmer and drier as a result of less rainfall. Agriculture is being more threatened by rising temperatures and decreasing rainfall in the area. Farmers' inventiveness and trial-and-error efforts, such as switching to new crops and their types, moving planting dates, and implementing rain water collection technology, among others, have developed answers to new challenges and concerns brought about by changing climatic scenarios. The tribals' adaptive capability was affected by things like the education level of the household head, the length of time spent farming, the amount of money earned from sources other than farming, the availability of loans and extension services, and so on.

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