

**Assessing Knowledge and Practices of Farmers on Climate Change Adaptation in Panchkhal Municipality-3, Kavrepalanchok, Nepal- by Kathayat N. K. & Pasa R. B.**

Authors	Nanda Kumari Kathayat <sup>1</sup> , Dr. Rajan Binayek Pasa <sup>2</sup>
Affiliation	<sup>1</sup> Teacher at Laxmi Shikshya Sadan Secondary School Teku, Kathmandu  <sup>2</sup> Asst. Prof. at Central Department of Rural Development Tribhuvan University, Kirtipur, Kathmandu
Email	<a href="mailto:nandakathayat1149@gmail.com">nandakathayat1149@gmail.com</a>  <a href="mailto:rajan.pasa@cdrd.tu.edu.np">rajan.pasa@cdrd.tu.edu.np</a>

**Abstract**

*Climate change poses significant threats to agricultural sector in Nepal. This study assesses farmers' perceived knowledge on climate change in Panchkhal Municipality-3, focusing on effective climate change adaptations. The study used quantitative approach and survey method in which required data were collected from 108 farmers selected randomly. Primary data were collected through self-administered household survey questionnaires, while secondary data were generated from government reports and policy documents. The study used Integrated Farming Systems, and Cultural Theory of Risk for analyzing technological, ecological, and socio-institutional dimensions of adaptations. The study found that farmers are predominantly rely on digital platforms (42.6%) and traditional media (38%) for receiving climate change adaptations related information. Major threats of climate change include soil fertility loss (36.1%), erratic rainfall (21.3%), and high input costs (93.5%). While 75.9 percent of farmers reported experiencing extreme weather, adaptation practices remain limited, with only 29.6 percent adopting crop diversification and 21.3 percent dependent on chemical inputs. Institutional support*

*is heavily state-centric, with 86.1 percent of farmers relying on government programs, yet coordination and resource allocation remain weak. The study concludes that despite awareness of climate risks, farmers' adaptive capacity is constrained by financial barriers, insufficient technical training, and ineffective governance. For applying effective adaptation strategies, national policy need to shift from a top-down approach to a subsidized, data-driven, and locally integrated approach. Municipal policy must prioritize hyper-local implementation through by-laws and municipal budgets that support capacity and skill development training, infrastructure upgrades, and institutional capacity of the stakeholders. Furthermore, market sector policy need to create an enabling environment through financial de-risking, standards for "climate-resilient" products, and Public Private Partnership frameworks. Agriculture cooperatives policy need to strengthen and empower farmers as central actors in adaptation.*

**Keywords:** Adaptations, Agriculture, Climate change, Commercial farming, Panchkhal

## **Background**

Climate change, defined as a long-term shift in climate patterns attributable to human activity that alters the global atmosphere (UNFCCC, 2025), poses a fundamental threat to global agricultural systems. Smallholder farmers in developing regions are disproportionately vulnerable to its impacts, such as shifting weather patterns and prolonged droughts (Below et al., 2015; Mertz et al., 2009). Their adaptation practices are critical for resilience and are shaped by a complex interplay of knowledge, resources, and institutional contexts (Reddy et al., 2022; Arbuckle et al., 2015).

Theoretical frameworks offer crucial lenses for understanding these dynamics. The Integrated Farming System (IFS) posits that synergistically integrating crops and livestock can enhance nutrient cycling, improve soil quality, and spread economic risk, thereby reducing dependence on external inputs and building systemic resilience (John et al., 2008). Concurrently, the Cultural Theory of Risk (CTR) argues that risk perception and management are not neutral but are shaped by institutional cultures—whether hierarchical, market-individualist, or egalitarian—which determine how threats are recognized and what solutions are deemed legitimate (Rayner, 1992; Thompson & Rayner, 1998). These frameworks highlight the gap between technically optimal

adaptations like IFS and the socially embedded realities of risk perception and resource access that constrain farmer decision-making.

Empirically, Nepal is a stark example of acute vulnerability, where agriculture is severely affected by observable changes in temperature and precipitation (Manandhar et al., 2011; Paudel et al., 2020). The country experiences significant warming trends, particularly in its mountain regions, exacerbating risks like soil erosion and glacial lake outburst floods (Dahal et al., 2022). While farmers employ local adaptations based on indigenous knowledge, such as altering planting dates or adopting drought-resistant crops (Khatri & Pasa, 2023a; Sherpa, 2023; Belay et al., 2022), their efforts are severely hampered by pervasive barriers. These include limited financial resources, inadequate infrastructure, knowledge gaps, and weak institutional support, which restrict the adoption of more sustainable, integrated practices (Devkota et al., 2018; Guo et al., 2021). This situation reflects the broader global pattern where developing countries bear the brunt of climate impacts due to lower adaptive capacity (Dell et al., 2012).

Despite the urgency, localized studies examining the interplay between farmers' knowledge, their adaptation practices, and the governing institutional cultures in Nepal's hilly regions remain scarce. This study therefore aims to analyze farmers' perceived knowledge and practices on climate change adaptation in Ward 3 of Panchkhal Municipality, Kavrepalanchok District. By applying the lenses of IFS and CTR to this localized context, the research seeks to address a critical gap and provide evidence to inform resilient agricultural planning that bridges the divide between scientific recommendation and on-ground feasibility.

The Shreemadbhagavadgeeta, a seminal-influential philosophical scripture of the Sanatan Vedic tradition, presents a timeless dialogue on human ethics, duty, and liberation that resonates deeply with the contemporary global vision of sustainable development (Badal 2024). Gautama Buddha, the emblem of peace and love, pioneer of Buddhism, was born in Kapilabastu, Lumbini, Nepal. The peace and love. Compassion in Buddhism is the basic element of Sustainable development. Thus Buddha is the pioneer of sustainable development. Buddha's text Dhammapada in the present sustainable era is more relevant than past (Badal, 2021). Thus climate change adaptation must be guided by Geeta and Buddha.

### **Objectives and Methodology**

The objectives of the study were to assess farmers' perceived knowledge on climate change and climate change adaptation practices applying by the commercial farmers residing in Panchkhal

Kavrepalanchok. In doing so, the study used quantitative approach and descriptive survey method (Creswell & Creswell, 2023). Required data were collected from randomly selected 108 farmers (34% of sample population). More so, total 312 commercial farming households belong to Ward 3 of Panchkhal Municipality were regarded as sample population of the study (PMO, 2024). During data collection, the study used self-administered household survey questionnaires. Collected data were subsequently managed and analyzed by using SPSS-27 software. The analysis involved descriptive statistical techniques, including frequency tabulation, the calculation of means and standard deviations, and Likert scale analysis to interpret the findings.

**Results: Social Demographics**

The demographic profile of the surveyed group is predominantly young and male (Table 1). The majority (53.9%) are of working age, between 23 and 40 years old, and 61.1 percent are male. Hinduism is the dominant religion (94.4%), and nearly all participants (87%) are married. The primary language is Nepali (87%), and most individuals (62.1%) have an educational attainment of high school completion. This outlines a community of mostly young, married, Nepali-speaking Hindu men with moderate levels of education.

**Table 1 Characteristics of the Respondents**

Category	Response	Frequency	Percent
<b>Age</b>	23-40	58	53.90
	41-60	41	38.10
	61-77	9	8.20
<b>Gender</b>	Male	66	61.10
	Female	42	38.90
<b>Religion</b>	Hindu	102	94.40
	Buddism	5	4.60
	Christian	1	0.90
<b>Marital status</b>	Unmarrie	9	8.30
	Married	94	87.00
	Widow	5	4.60
<b>Mother Tongue</b>	Nepali	94	87.00
	Tamang	11	10.20

	Dunuwar	3	2.80
<b>Educational</b>	Literate	9	8.30
<b>Status</b>	Primary and lower secondary	25	23.10
	Secondary	67	62.10
	Higher education	7	6.50
<b>Total</b>		108	100.00

(Source: Study, 2025)

### Family Income and Expense

Family income of the farming households found significant disparities across different sources of income (Tables 2 and 3). Agriculture and business seems prominent sources of family income and remaining serve as supplementary, with earnings potentials. This differences highlights inequalities in both opportunity and outcomes. Besides, some sources of income offer substantial financial returns for the minority while providing modest average incomes.

**Table 2 Annual of Family Income (NRs.)**

Sources	Max	$\bar{x}$	SD
<b>Agriculture</b>	1500000	164550	215240
<b>Animal husbandry</b>	500000	30694	74164
<b>Business</b>	1500000	37685	205492
<b>Poultry</b>	200000	6861	29279
<b>Mushroom</b>	50000	1028	6859
<b>Service</b>	400000	53611	114658
<b>Remittance</b>	1200000	196759	256688
<b>Wage labor</b>	300000	15777	51982
<b>Other</b>	500000	15231	61535

(Source: Study, 2025)

The findings shows that agriculture ( $\bar{x}$  164,550 and Max 1,500,000) is a primary income source for households followed by remittances ( $\bar{x}$  196,759 and Max 1200000). Other sources such as business, animal husbandry, and poultry show a pattern of low average incomes but extremely high maximum possible returns, indicating that most households depends on multiple sources of family income. Besides, the majority 80.6 percent of the farmers got membership in financial institutions for over a decade. A notable membership jumps from 5.6 percent in the 6-10 years into 41.7 percent in the 10-15 years category.

**Table 3 Annual Income and Expense (NRs.)**

Family Income			Family Expense		
Range	Frequency	Percent	Range	Frequency	Percent
<b>50000-299000</b>	42	38.90	50000-199000	48	44.40
<b>300000-699000</b>	39	36.20	200000-399000	48	44.40
<b>700000-1099000</b>	12	10.90	400000-699000	6	5.50
<b>1100000-2000000</b>	15	13.60	700000-1200000	6	5.50
<b>Total</b>	108	100.00	<b>Total</b>	108	100.00

(Source: Study, 2025)

Above statistics depicts that majority 75.1 percent of the respondents' income falls under low-to-middle-income. About 38.9 percent of households earn 50,000–299,000, and 36.2 percent earn 300,000–699,000. Only 24.5 percent of households earn over 700,000, and 13.6 percent over 1,100,000-2,000,000. This segmentation differs greatly from expenditure trends. Nearly 90 percent of households spend less than 400,000, with 50,000-199,000 (44.4%) and 200,000-399,000 (44.4%) split consistently. Most families spend little, even if their income changes. The small but distinct group in the highest income bracket (13.6%) and few people in the same spending categories may indicate that wealthier households are saving a lot or not reporting all their expenses. These financial trends reveal the assessed population's economic reality and spending patterns.

### Multiple Aspects of Climate Change

This section highlights how farmers get information, how climate change affects farming activities, and how farmers think about climate change issues. Digital platforms (42.6%) and traditional media like radio and TV (38%) are the main sources of information, with community

networks (13.9%) adding to them. Print media and experts don't play a big role. Farmers have a lot of problems in agriculture, with soil fertility loss (36.1%) and lower productivity (25.9%) being the biggest ones. Erratic rainfall (21.3%) and pesticide problems (16.7%) make these problems worse. Climate change is very real, with 75.9 percent of people experiencing both extreme cold and heat. Environmental effects are mostly caused by too much rain (46.3%) and loss of biodiversity (22.2%). Khatri and Pasa (2023b) also found that majority of the farmers in Nepal experienced and strongly perceived changes in climatic factors and events.

Similarly, the Likert scale analysis (1 strongly disagree to 5 strongly agree) shows that farmers are somewhat aware of climate change (mean scores of 2.50–3.02). They are most aware of industrial pollution (3.02). However, their inconsistent responses to other items demonstrate that they don't have sufficient knowledge about climate change. Besides, severe systemic hurdles make it hard for farmers to be resilient. These include high input costs (93.5%), lack of institutional support (89.8%), land price problems (84.3%), labor shortages (79.6%), and not enough storage (80.6%). These results show how important it is to have solutions that deal with financial and infrastructure problems in order to make agriculture more sustainable and help the region adapt to climate change.

### **Farmers’ Involvement in Capacity and Skill Development Training**

This section highlights critical connection between farmers' awareness of climate impacts and their access to actionable knowledge for systemic adaptation. Owing to that a range of agricultural training programs have been offered to the farmers in municipal level. That including seed preparation, 3-day to 15-day general courses by government and municipalities, a 1-week IPS Krishni knowledge module, and a 3-month specialized onion cultivation training (Table 4).

**Table 4 Participated in Skill Development Training**

<b>Response Category</b>	<b>Frequency</b>	<b>Percent</b>
<b>Seed preparation and soil fertility training</b>	23	21.30
<b>Agriculture Training 15 days</b>	4	3.70
<b>Agriculture training 6 days municipality</b>	1	0.90
<b>Agriculture Training 7 Days</b>	1	0.90
<b>Agriculture Training by Govern</b>	3	2.80
<b>Agriculture Training for 3 Day</b>	1	0.90

<b>Agriculture, 3 Day by Municipality</b>	1	0.90
<b>IPS, 1 week Krishni knowledge</b>	2	1.9-0
<b>Onion Training for 3 Month</b>	5	4.60
<b>Not yet received any trainings</b>	67	62.00
<b>Total</b>	108	100.00

(Source: Study, 2025)

Participants preferred seed preparation training (21.3%, n=23). This may indicate that it is the most accessible or crucial intervention. Most other training programs enroll 1–5 participants. Only 6.5 percent reported 3- to 7-day training sessions. A mere 4.6 percent had the 3-month onion training. Because replies are spread out among several categories with identical wording (for example, different 3-day trainings), training services may be fragmented, either because they come from different suppliers (municipal vs. government) or because programs are not standardized.

The statistics shows that an alarming 62 percent (n=67) had never received agricultural extension training, indicating a dearth of information and services. Access to information might remain top-down and fragmented not relying on right to information. This aligns with Rayner’s (1992) concept of a hierarchical bureaucratic institutional culture, where risk is managed through formal channels, and explains the gap between recognizing equal access to information. The most of the farmers participated in seed preparation and soil fertility trainings. Regmi and Adhikari (2007) also argue soil fertility loss and declining productivity becoming primary challenges due to climate vulnerability in Nepal However, prevalent response of using chemical inputs highlights a maladaptive cycle. This reactive approach contrasts with the principles of Integrated Farming Systems (John et al., 2008), which promote nutrient cycling. Overwhelming constraints like high input costs and a stark lack of skills training lock farmers into short-term coping strategies (Dell et al., 2012).

### **Multiple Aspects of Climate Change Adaptation**

Farmers confront serious problems in farming and climate, with productivity losses (38.9%) and capital depletion (18.5%) being the most important issues. Most farmers deal with unpredictable weather (75.9% say temperatures are too high, and 46. Percent say there is too much rain), but they are strong and only 13 percent are thinking about moving because of climate change. Adaptation techniques prefer practical changes like switching animal breeds (29.6%) and crop patterns (25.9%). However, dependency on chemical inputs (21.3%) is still high, even if more people are

starting to farm organically (mean=3.76/5). Institutional reliance strongly favors government entities (86.1%) over NGOs (13.9% combined), which shows that trust networks are very state-centered. Overwhelming institutional dependence on government (86.1%) over NGOs (13.9%) perfectly illustrates the Cultural Theory of Risk (Rayner, 1992). The farming community, within its "hierarchical bureaucratic" cultural setting, seeks risk management through formal, rule-based state structures. This dynamic is critical in Nepal's context, where Regmi and Adhikari (2007) document state-led adaptation as a primary response to significant climate vulnerabilities in the mountains.

There are big gaps in skills training (62% didn't get any) and economic engagement (52.8% didn't make any sales), and land use modifications are quite limited (82.2% didn't make any). Labor management typically uses both family and outside networks (75%), which shows that social capital is well-balanced. Adger et al (2018) define adaptation as dependent on available resources, and these data points reveal a critical resource gap in knowledge, market access, and capital for land improvement. This situation exacerbates the vulnerability described by UNFCC (2017) and Practical Action (2008), where climate impacts lead to production losses and fallow land. The finding that most farmers report high temperatures (75.9%) and erratic rainfall (46.3%) yet remain resilient (only 13% consider migrating) confirms Pasa et al. (2024) observation of high vulnerability in Himalayan region of Nepal, but also highlights a capacity of ensuring sustainable-adaptation measures in high-risks areas.

The discussion must also consider the demographic and economic profile of the community—predominantly young, moderately educated male farmers with agriculture and remittances as key but unequal income sources. This profile supports Zhai et al. (2009) argument that developing countries with agriculture-based economies are more vulnerable. The high inequality in agricultural income ( $\bar{x}$ 164,550, but highly skewed) indicates that the capacity to invest in integrated or climate-smart practices is still questionable.

The findings also shows that farmers are dealing with climate vulnerabilities using a mix of conventional and new methods. They are limited by a lack of knowledge and hurdles to market access, yet they still rely heavily on government support systems. These results show how important it is to have integrated interventions that include expanding climate-smart agriculture, targeted skills development, and better coordination amongst institutions to make this mostly government-dependent agricultural system more resilient. More specifically, for the climate

change adaptation, chemical fertilizers and insecticides are the most common adaptations, identified by 21.3 percent of respondents (Table 5). This suggests that they rely heavily on agricultural inputs to boost productivity or fight pests. Changing crop breeds (20.4%) comes in second, showing that farmers are willing to try out or accept better types.

**Table 5 Adaptation Strategies of the Farmers**

<b>Categories</b>	<b>Frequency</b>	<b>Percent</b>
<b>Change cultivation date</b>	13	12.00
<b>Change types of crops</b>	15	13.90
<b>Change the breed of crops</b>	22	20.40
<b>Crops to animals</b>	9	8.30
<b>Animal to crops</b>	2	1.90
<b>Less animals</b>	2	1.80
<b>Irrigation use</b>	14	13.00
<b>Using trees leaves for shadow</b>	8	7.40
<b>Chemical fertilizer and insecticides</b>	23	21.30
<b>Total</b>	108	100.00

(Source: Study, 2025)

The data shows that most (21.3%) of the farmers used chemical fertilizers and insecticides for the adaptation. Higher temperatures reduce agricultural output, potentially pushing farmers toward short-term yield-protecting measures like chemicals rather than long-term systemic resilience (Dell et al., 2011). The moderate uptake of organic farming (mean=3.76/5) and changes in crop breeds (20.4%) indicates an emerging awareness of sustainable practices, as encouraged by FAO (2019), but not yet a wholesale transformation. The literature also says that integrated systems that combine crops and livestock enhance nutrient cycling, improve soil quality, and spread economic risk (John et al., 2008),

### **Conclusions and Policy Implications**

This study concludes that farmers have a basic awareness of how climate change affects farming activities, but they don't have sufficient adaptation related knowledge and skills. Most of the farmers still use old-fashioned farming methods and quick fixes, such switching crop types or adding more chemicals, instead of switching to long-term, sustainable approaches. This gap in adaptive ability shows how important it is to have focused training programs that help farmers

improve their technical skills in climate-resilient farming. Farmers' vulnerability is greatly affected by activities taken to adapt to climate change. People who used adaptive measures like growing different kinds of crops, saving water, or farming organically said they lost less and their farms were more productive. However, these approaches are not widely used because people don't have access to localized climate data, they don't have enough money, and institutions don't assist them enough. Erratic rainfall, soil degradation, and severe temperatures are still threatening people's lives. This shows that existing adaptation efforts are not yet enough to protect people from climate hazards.

For applying effective adaptation strategies, national policy need to shift from a top-down approach to a subsidized, data-driven, and locally integrated approach. This requires allocating sufficient climate change adaptation funds, decentralizing climate data services, and mandating coordination with local governments to ensure equitable support for smallholder farmers. Municipal policy must prioritize hyper-local implementation through by-laws and municipal budgets that support capacity and skill development training, infrastructure upgrades, and institutional capacity of the stakeholders. Success depends on empowering local committees and integrating traditional knowledge with resilient practices. For the market sector, policy need to create an enabling environment through financial de-risking (e.g., tax incentives, blended finance), standards for "climate-resilient" products, and Public Private Partnership frameworks. Regulations must ensure ethical engagement with smallholders, tying private investment to national resilience goals. For agriculture cooperatives and farmers' groups, need to strengthen and empower farmers as central actors in adaptation. This includes supporting their role in knowledge dissemination, collective marketing, and including them in local agricultural planning and decision-making forums.

## References

- Adger, N., Huq, S. Brown, K., Conway, D. & Hulme, M. (2003). Adaptation to climate change in the developing world. *Progress in Development Studies*, 3(3), 179–195. <https://doi.org/10.1191/1464993403ps060oa>
- Arbuckle, J. G., Jr., Morton, L. W., & Hobbs, J. (2015). Farmer beliefs and perceptions of climate change: A mixed methods approach. *Environment and Behavior*, 47(4), 373-398. <https://doi.org/10.1177/0013916513503832>
- Badal, B. P. (2021). Buddhists Herminutics: An Analysis of Dhammapada in Sustainable

- Development. *Research Nepal Journal of Development Studies*, 4(1), 27–43.  
<https://doi.org/10.3126/rnjds.v4i1.38035>
- Badal , B. P. (2024). Hermeneutic Analysis of the Shreemadbhagavadgeeta on the People Pillar of Sustainable Development. *Research Nepal Journal of Development Studies*, 7(1), 1–20. <https://doi.org/10.3126/rnjds.v7i1.86316>
- Belay, A., Oludhe, C., Mirzabaev, A., Recha, J. W., Berhane, Z., Demissie, T. D., & Solomon, D. (2022). Knowledge of climate change and adaptation by smallholder farmers: Evidence from southern Ethiopia. *Heliyon*, 8(3), e09097. <https://doi.org/10.1016/j.heliyon.2022.e09097>
- Below, T. B., Schmid, J. C., & Sieber, S. (2015). Farmers' knowledge and perception of climatic risks and options for climate change adaptation: A case study from two Tanzanian villages. *Regional Environmental Change*, 15(7), 1169-1180. <https://doi.org/10.1007/s10113-014-0720-y>
- Creswell, J.W. and Creswell, J.D. (2023) Research Design: Qualitative, Quantitative and Mixed Methods Approaches. Sage Publications Ltd.
- Dahal, K. R., Dahal, P., Adhikari, R. K., & Naukkarinen, V. (2022). Climate change impacts and adaptation in a hill farming system of the Himalayan region: Climatic trends, farmers' perceptions and practices. *Climate*, 10(3), 35. <https://doi.org/10.3390/cli10030035>
- Dell, M., Jones, B. F. & Olken, B. A. (2012). Temperature shocks and economic growth: evidence from the last half century. *Am. Econ. J. Macroecon.*, 4, 66-95  
<https://doi.org/10.1257/mac.4.3.66>
- Devkota, N., Phuyal, R. K., & Shrestha, D. L. (2018). Perception, determinants and barriers for the adoption of climate change adaptation options among Nepalese rice farmers. *Agricultural Sciences*, 9(6), 659-680. <https://doi.org/10.4236/as.2018.96046>
- FAO (2019). The State of Food and Agriculture 2019. Moving forward on food loss and waste reduction. Rome. Licence: CC BY-NC-SA 3.0 IGO.
- Guo, R., Li, Y., Shang, L., Feng, C., & Wang, X. (2021). Local farmer's perception and adaptive behavior toward climate change. *Journal of Cleaner Production*, 287, 125300. <https://doi.org/10.1016/j.jclepro.2020.125300>

- Khatri, B. B. & Pasa, R. B. (2023a). Climate Change Adaptation Strategies of the Communities in Bagmati Province, Nepal. *Pravaha*, 29(1), 89–102.  
<https://doi.org/10.3126/pravaha.v29i1.71409>
- Khatri, B. B., & Pasa, R. B. (2023b). People's Perception on Climate Change: The Context of Local and Global Discourse. *Asian Journal of Population Sciences*, 2(1), 68–79.  
<https://doi.org/10.3126/ajps.v2i1.51091>
- Manandhar, S., Vogt, D. S., Perret, S. R., & Kazama, F. (2011). Adapting cropping systems to climate change in Nepal: A cross-regional study of farmers' perception and practices. *Regional Environmental Change*, 11(2), 335-348. <https://doi.org/10.1007/s10113-010-0137-1>
- Mertz, O., Mbow, C., Reenberg, A., & Diouf, A. (2009). Farmers' perceptions of climate change and agricultural adaptation strategies in rural Sahel. (5), 804-816.  
<https://doi.org/10.1007/s00267-008-9197-0>
- Pasa, R. B., Rai, S., & Adhikari, D. (2024). Climate-Induced Disaster in Nepal: Assessing Impact of Glacial Lake Outburst Floods in Thame Valley, Solukhumbu. *Nepalese Journal of Development and Rural Studies*, 21(01), 39–48.  
<https://doi.org/10.3126/njdrs.v21i01.80394>
- Paudel, B., Zhang, Y., Yan, J., Rai, R., Li, L., Wu, X., & Khanal, N. R. (2020). Farmers' understanding of climate change in Nepal Himalayas: Important determinants and implications for developing adaptation strategies. *Climatic Change*, 158(3), 485-502.  
<https://doi.org/10.1007/s10584-019-02607-2>
- Practical Action Nepal (2008). *Promoting adaptation to climate change in Nepal*. Policy Briefing, Nepal.
- Rayner, S. (1992). Cultural theory and risk analysis. In S. Krimsky & D. Golding (Eds.), *Social theories of risk* (pp. 83-115). Praeger.
- Reddy, K. V., Paramesh, V., Arunachalam, V., Das, B., Ram, M., & Singh, V. K. (2022). Farmers' perception and efficacy of adaptation decisions to climate change. *Agronomy*, 12(5), 1023.  
<https://doi.org/10.3390/agronomy12051023>
- Regmi, B. & A. Adhikari. (2007). *Fighting Climate Change : HumanSolidarity in a Divided World*. UNDP, Nepal : HumanDevelopment Report.Sherpa, T. O. (2023). *Indigenous people's*

- perception of indigenous agricultural knowledge for climate change adaptation in Khumbu, Nepal. *Frontiers in Climate*, 5, 1122334. <https://doi.org/10.3389/fclim.2023.1122334>
- Thompson, M., & Rayner, S. (1998). "Cultural Discourses." In S. Rayner & E. L. Malone (Eds.), *Human Choice and Climate Change, Vol. 1: The Societal Framework* (pp. 265–343). Columbus, OH: Battelle Press.
- UNFCCC (United Nations Framework Convention on Climate Change). (2017). *Nationally determined contributions under the Paris Agreement: Synthesis report by the secretariat*
- UNFCCC (United Nations Framework Convention on Climate Change). (2025). Seventeenth meeting of the Research Dialogue 2025. [https://unfccc.int/sites/default/files/resource/Research\\_Dialogue\\_17\\_Summary\\_Report\\_2025.pdf](https://unfccc.int/sites/default/files/resource/Research_Dialogue_17_Summary_Report_2025.pdf)
- Zhai, F., Lin, T., & Byambadorj, E. (2009). A general equilibrium analysis of the impact of climate change on agriculture in the People's Republic of China. *Asian Development Review*, 26(1), 206–225. <https://doi.org/10.1142/S0116110509500073>