

Social production of vulnerability to climate change in the rural middle hills of Nepal



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ABSTRACT

This paper explores the social roots of rural communities' vulnerability to climate change, based on a field study conducted from 2012 to 2015 in the Panchkhal region of the Kavre district in the middle hills of Nepal. Drawing upon Bourdieu's concept 'field of practice', we identify three themes that are helpful to generate insights into the way vulnerability is socially produced in the hamlets of this region: social isolation, financial authority, and knowledge based supremacy exercised by the community elites and public officials. These factors operate to sustain social hierarchies and consequently constrain the long-term adaptability of marginalised groups. Three emergent adaptive strategies are also identified: human mobility, collective action, and occupational change. We conclude that vulnerability to the effects of climate change continues to be a largely socially produced phenomenon, shaped by complex interactions between social, cultural, economic and political processes happening in different places at different time scales.

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1. Introduction

Rural communities in the developing world are at high risk from climate change, and adaptation has become crucial in developing sustainable livelihoods (Parry, 2009; Smith and Wandel, 2006). Responding to this risk, climate change impact assessment and response discourses have shifted from a previous focus on vulnerability (Blaikie et al., 1994; Cutter, 1996; Sen, 1981) towards adaptation (Pielke, 1998; Smit et al., 2000). However, as we argue, work on adaptation still need to be informed by research into vulnerability, a complex phenomenon that varies among countries, regions and communities. Contemporary approaches to adaptation focus mostly upon proximate causes of vulnerability, for instance mechanisms of production, exchange and asset accumulation (Swift, 1989), and largely ignore the underlying causes of vulnerability (Ribot, 2011). Critical social researchers recognize the complex social roots of vulnerability (Blaikie et al., 1994) and the

contentious interpretation of these underlying causes (Ribot, 2014). Resonating in these studies is the need to understand the proximate and more underlying causes of vulnerability as we aim to enhance adaptation to climate change.

Among developing countries, Nepal is one of the most vulnerable to climate change (Maplecroft, 2011) due to the high rate of poverty, low level of development, high dependence on subsistence agriculture, and its mountain-based geographic location leading to greater impacts of increasing temperature and increasing exposure to climate risks such as Glacier Lake Outburst Floods (GLOF) (Agrawala, 2004; Eriksson et al., 2009; Ives, 1987). The Middle Hills region of Nepal is considered one of the most vulnerable parts of the country due to high topographical variation and a complex interaction of social, ecological, political and economic factors (McDowell et al., 2013; Shrestha et al., 1999). The presence of multiple ethnic and socio-economic groups, particularly resulting from a rigid caste system - means that more nuanced analyses and localised studies are required to understand climate change vulnerabilities in this region.

In this study we aimed to assess the causes of vulnerability in rural communities. We go beyond explaining the proximal causes of vulnerability - which is the prominent mode of vulnerability analysis in Nepal - to investigate how socio-cultural interactions,

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and deeply entrenched interrelationships among people, produce and reinforce vulnerability. We also aim to explain why and how different social groups in the community experience varying degree of vulnerability. We used Bourdieu's theory of practice (Bourdieu, 1972) as a framework of analysis. In order to simplify Bourdieu's language, we use the terms *cultural codes*, *social agent* and *dissonance* (Nightingale and Ojha, 2013) to correspond with Bourdieu's concepts of *Doxa*, *habitus* and *hysteresis*. By exploring these underlying causes of social difference, the paper demonstrates how multiple fields and subfields interact within the dynamic process of social construction to cause differential vulnerability of individuals and households in a community that ultimately affect the way they adapt. 'Social production' here is used here broadly as a cause and effect chain linkage among the social factors. This analytical perspective advances our understanding of why certain people become more vulnerable than others in the same locality, and also how communities' vulnerability conditions get worsened by underlying social structure and relationships. As such, this analysis also highlights the need to temper adaptation research with better understanding of social dynamics causing vulnerability to climate change.

The paper is organised as follows. An overview of contemporary trends in research on vulnerability in relation to limitations in policy and practice is presented in Section Two. In Section Three, we present the methodological approach and describe the study area. In Section Four, we describe how climate change impacts on people's livelihoods, the emerging adaptive strategies and how socio-cultural hierarchies and cultural codes affect adaptation outcomes in different parts of the society in the case study area. In Section Five we show how the social production of vulnerability is historically entrenched within the socio-economic differentiation in this particular society and discuss how and why these causes of vulnerability have been systematically disregarded in policy arenas. In Section Six, we conclude by linking our findings with existing theoretical knowledge.

2. Vulnerability – current knowledge gaps and framing in this study

The concept of vulnerability can be traced back to research on risks and hazards (Blaikie et al., 1994; Cutter, 1996), food security and famine (Watts and Bohle, 1993), and to development studies on coping by the poor (Chambers, 1989). Previous studies of social vulnerability utilized deductive and empirical approaches to strengthen the research proposition that differentiation in socio-political power exacerbates vulnerability at grass roots levels (Aryal et al., 2014). Likewise, studies (Becken et al., 2013) that recognize cultural dimension of climate change are limited to understanding perception of impacts in livelihoods. What appears of particular concern to scholars here is that marginalized people are more likely to be affected by climate change (Adger et al., 2001; Downing, 2003; Smit and Pilifosova, 2001) for multiple social, cultural, economic and political reasons (Adger, 1999; Jones and Boyd, 2011; Ribot, 2014). Moreover, interactions between these processes are occurring at different places and times, which makes the assessment of longer term vulnerability more complex (Ribot, 2010). This realisation has led to the application of grounded approaches to explore the underlying socio-cultural dynamics that lead to vulnerability.

Vulnerability to climate change has been studied in a variety of ways. The basic premise is that pre-existing conditions of any individual or household determines their capacity to anticipate and respond to climate change (Adger, 1999, 2006; Blaikie et al., 1994; Sen, 1981; Watts and Bohle, 1993). Another widely accepted inference across this body of work is that vulnerability is an inherently

complex phenomenon. For instance despite the realization that poverty exacerbates vulnerability (Adger et al., 2003; Eriksen and O'Brien, 2007), using economic condition as the only proxy of vulnerability is found to be a limited view. Because vulnerability is constructed through social, economic and political processes and their complex interactions (Blaikie et al., 1994; Ribot, 2010), deconstruction of those processes is a necessary step. Moreover, vulnerability studies can be incomplete if they do not consider the historical and spatial dimensions that underpin the causality of vulnerability (Ribot, 2014). Even those studies that recognize these dimensions (Ghimire et al., 2010) often do not provide an adequate account of the cultural politics of adaptation (Jones and Boyd, 2011).

Developing adaptation policy has been a priority in most highly vulnerable developing countries however adaptation policies generally do not recognise the cultural and historical constructs of vulnerability. These policies and strategies have predominantly been built upon the IPCC guide (IPCC, 2001, p995) that defines vulnerability as 'the degree to which a system is susceptible to or unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity'. Previous vulnerability studies conducted in the Nepalese context have been dominated by this deterministic approach (Ghimire et al., 2010; McDowell et al., 2013; Pandey and Bardsley, 2015; Panthi et al., 2016). However, this approach has been criticized for overlooking non-climate related issues, thus restricting its ability to explore the social, cultural and economic causes of vulnerability (Hinkel, 2011).

Instead of relying on determinants and indicator-based assessments, more critical approaches have analysed the underlying social and cultural politics of vulnerability. Watts and Bohle (1993, p.46), for instance, define vulnerability as "multi-layered and multi-dimensional social space which centres on the determinate political, economic and institutional capabilities of people in specific places at specific times". This framing of vulnerability encourages a deeper understanding of the multiple social, economic and political processes at play across different spatial and temporal scales. It is more appropriate for Nepalese society which is characterized by a long-standing and deeply-rooted hierarchy (Regmi, 1999) manifested through wealth, class, caste and gender discrimination, and which potentially exacerbates the vulnerability of some communities and groups (Gentle and Maraseni, 2012; Jones and Boyd, 2011; Nightingale, 2011). However, despite offering a spatial-temporal account of vulnerability, this framing still lacks insights into how cultural politics underpins vulnerability. This study aimed to provide some new insights into how cultural dimensions affect vulnerability and adaptation of marginalized groups in rural areas of Nepal.

Our study was based on the ontological assumption that vulnerability is contextual (O'Brien et al., 2007) and is differentiated along socio-economic and cultural disparity lines. However, it is problematic to expect that respondents themselves associate their vulnerability with the differential power relations that operate at multiple temporal and spatial scales. By examining the situation using subjective analysis and abductive reasoning (Haig, 2005; Ong and Kok, 2012) we were able to better understand what determines vulnerability at a local level. In so doing, Bourdieu's theory of practice was used to link these subjective and objective forms of knowledge (Bourdieu, 1972).

Following Bourdieu (1972), constructing the field of practice (Fig. 1) was the methodological entry point. Field is the conceptualisation of unstructured reality into a structural context. According to Bourdieu, this makes delineation between different fields possible and manageable, such as the fields of politics, culture

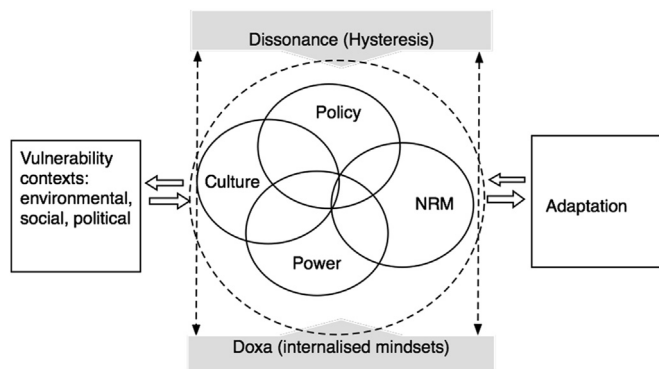


Fig. 1. Cultural effect in vulnerability and adaptation in the field of natural resources.

or policy. For instance, a social field is a multi-dimensional space of positions upon which social constructs are drawn (Bourdieu, 1985). People's positioning in the field is indicative of their power to influence others, as it draws upon interactions between social agents (which Bourdieu defines as *habitus*, to emphasize a culturally embedded view of human agency) and differentiated access to various forms of capital that are circulating in the field. Capital not only indicates economic assets, but also refers to competence and legitimacy in drawing upon social resources (Bourdieu, 1986).

Fields are dynamic, and create a dissonance between the way social agents think and the actual realities of the social field in which they engage in various practices – such as agriculture, forest management, or water harvesting. Bourdieu calls such dissonance *hysteresis*. Bourdieu's field of practice has the potential to deepen our understanding of the process of adaptation by helping to explain how well the social agents affected by climate change can respond to this change by altering their practices. Another of Bourdieu's concepts used here to elaborate how vulnerability is constructed is *doxa* (cultural codes in this study), in order to understand how power is enacted through socio-cultural values embedded in society. As Bourdieu explains, *doxa* is the state of everyday practice where existing norms and values become unquestioned, reinforcing their legitimacy even under an altered state of a field. These concepts are used to explore how the existing socio-cultural norms embodied and institutionalized in everyday practice have produced and preserved vulnerabilities through symbolic domination rather than through the impact of physical forces. Different fields and sub-fields are connected to each other (Waquant, 1989).

The overarching framework of analysis in this paper was produced based on the knowledge that the field of power is central to vulnerability and adaptation to climate change (Ribot, 2014). In order to understand the implications of emerging themes in climate adaptation, the conceptual difference between coping and anticipation is emphasised: Coping refers to short term responses, while anticipation captures longer term response strategies that consider possible future change beyond the past experiences (Parry, 2009). Further analysis drew on the linkage between culture and power (Fig. 1), which has largely been ignored in climate vulnerability studies. According to Bourdieu (1985), the field of culture and the field of power, despite being separate, are not completely independent of each other in the broader social field.

3. The study area and methodological approach

The findings presented in this paper are based on a study of the rural society of Panchkhal (Fig. 2), located in Kavre district of Middle Hills Nepal. Panchkhal is a widely recognised vegetable supply region for Kathmandu. Panchkhal was selected based on an

in-depth investigation across nested scale at national, sub-national to local social, environmental, cultural and political landscapes. This study area provided an interesting case of a heterogeneous society comprising various caste and ethnic groups, including the lowest caste - the Dalits. The case study also reflected the multiple and diverse needs and interests in common property resources such as forests. For example, the Thuli community forestry user group located in Panchkhal provided an interesting case of attempts to increase social inclusion in common property resource management, as it explicitly changed its institutional rules to hand over executive power to a women-only committee – a deliberate process of empowering of a marginalized group which makes the case highly relevant to understand how socio-economic dynamics interacts with environmental change including climate.

The caste system is important in Panchkhal (Table 1). The system used to be the main basis for the distribution of occupations, which over the centuries created a hierarchical¹ structure in Nepalese society. Most of the artisanal work such as blacksmithing, tailoring, shoemaking and carpentry are still undertaken by Dalits² (The World Bank, 2006). Hierarchy based on caste (Bennett, 2005) was officially maintained in Nepal by the *Muluki Ain* (Civil Code) of 1854, until it was abolished in 1963. However, the current distribution of 'natural capital' resources among the people and wider societal norms are historically embedded in the traditional feudal and patriarchal system (Regmi, 1978, 1999). Despite several legal reforms in governance³ and policy⁴ that were intended to discourage institutionalized social inequality based on caste, gender and ethnicity, social discrimination and differentiation in power persists in different forms, particularly in rituals that are more symbolic in nature (Nightingale, 2006, 2011).

In the caste classification, *Brahmins* and *Chhetris* continue to occupy a superior position in the rural Panchkhal area, whereas Dalits and Indigenous groups are considered to belong to inferior groupings. Justified by the assumption that their occupation did not require them to have fertile land to survive, Dalits occupy marginal and infertile lands. Historically they used to barter their services with Brahmin and Chhetri. However, changes brought about by multiple environmental, social and economic processes occurring at both global and regional scales have impinged on their livelihoods.

The economy of this region is predominantly agrarian and people depend upon rain-fed irrigation. There is a strong linkage between climate and livelihoods, and changes in temperature and rainfall patterns have strong implications for the local economy (Dixit et al., 2009). The region has a monsoon climate with a dry season from October to May (Dixit et al., 2009). Empirical data indicates an increasing trend of temperature rise in the mountain region, more than in the plain areas (ICIMOD, 2011; Shrestha et al., 1999). Meteorological data in Panchkhal region over the last 30 years shows a steady decline in total annual rainfall and average temperature is rising, consistent with global trends of change (Fig. 3). Panchkhal was declared a severely drought-affected Village

¹ In the caste hierarchy of Nepal, Brahmins in their role as priests were at the top, with Chhetris (kings and warriors) just beneath them. Vaishyas (merchants) and Sudra (peasants and labourers) came next and anyone not in these four groups were considered untouchables (Bennett, 2005).

² Dalit is a widely accepted term to refer to the group of castes formerly called 'untouchable', who now call themselves Dalits, which means 'oppressed, broken or crushed' (The World Bank, 2006).

³ Change from the autocratic Rana regime to the party-less Panchayat system, multi-party democracy along with constitutional monarchy to the people's republic nation.

⁴ Constitutional 1990 and Caste-based Discrimination and Untouchability (Offence and Punishment) Act, 2068 articulated non-hierarchical plural society.

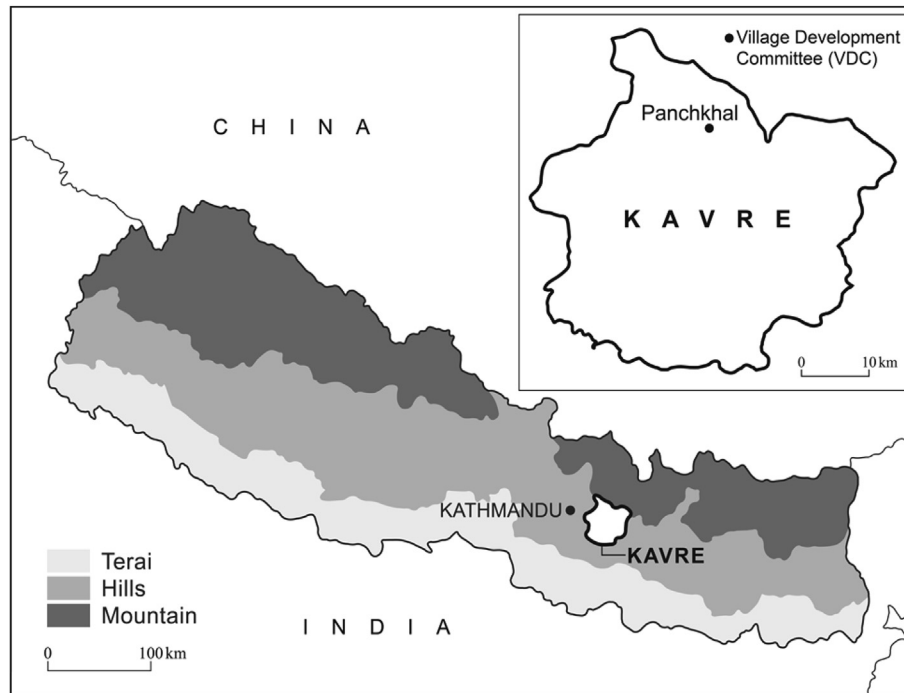


Fig. 2. Map of Nepal showing study area.

Table 1

Differentiated livelihood strategies of forest users based on their caste.

Caste/ethnicity	Current livelihood strategy
Brahmin (n = 287)	Agriculture (70%), Job (23%) and others including business and labour (7%)
Chhetris (n = 94)	Agriculture (57%), Job (36%), Business (5%) and labour (2%)
Dalit (n = 74)	Seasonal migration (40%), labour (20%), traditional occupation (18%) and agriculture (20%)
Indigenous: Newar, Tamang and Bhujel (n = 52)	Agriculture (65%), Business (25%) and labour (10%)

Adapted from Constitution of Thuli CFUG, Panchkhal (2013).

Development Committee⁵ in 2006, although overall Kavre is identified in the National Adaptation Programme of Action (NAPA) as a district with low drought risk (MOE, 2010) but more frequent extreme events have been predicted for the future (Shrestha et al., 1999).

3.1. Research approach

The research approach adopted for data collection was an embedded case study with ethnography. Using such a rural agrarian setting, positioned in a particular historical and spatial context, is a typical case study approach (Yin, 2009). Ethnographic research methods included subjective analysis and narrative development (Paschen and Ison, 2014) that were mainly carried out through observations of people's activities, narrative interviews, informal talks, symbolic statements, observed resistance in people's expression during interviews and Focus Group Discussions (FGD). This sociological approach draws upon the importance of understanding human behaviour through the process of discovery without interference from the 'researcher' (Strauss, 1987). Abductive reasoning was used, where inferences are logically deductive and empirically inductive (Haig, 2008). Two of the authors of this paper come from a similar socio-cultural context of Nepal and are familiar with local culture, lifestyle and dialects. This provided

further advantages in conducting ethnographic field research and forming a strong basis for abductive reasoning. Any study conducted in a society characterised by definitive social hierarchies requires critical examination of psychological processes and cultural practices and is better investigated through an abductive strategy (Haig, 2008; Ong and Kok, 2012).

3.2. Sampling and data collection

Interviewees were chosen through snowball sampling at the beginning but, as we were not able to reach the marginalized groups easily using this method, we also used purposive sampling. We continued sampling and interviewing people until we reached data saturation. We interviewed 35 women and 42 men from across different caste groups in Panchkhal. Moreover, relevant key informants (in terms of their knowledge of local issues) were interviewed from the national to the local levels (Table 2).

Information on climate conditions and associated impacts was drawn from meteorological data (rainfall and temperature) and local people's perceptions and experiences. People were asked open-ended questions about their livelihoods and how these are affected by climate change and how they cope with those events, with particular reference to the occurrences of delayed rainfall, hailstorms, storms or other severe events. With an understanding that vulnerability is a pre-condition that hampers adaptation efforts of any individual or households, people were also encouraged to talk and relate stories of how they had adapted to changes in their livelihood situation.

⁵ Panchkhal was a Village Development Committee (VDC) during data collection in 2013 but it has become a Municipality since May 2014, as declared by the government of Nepal.

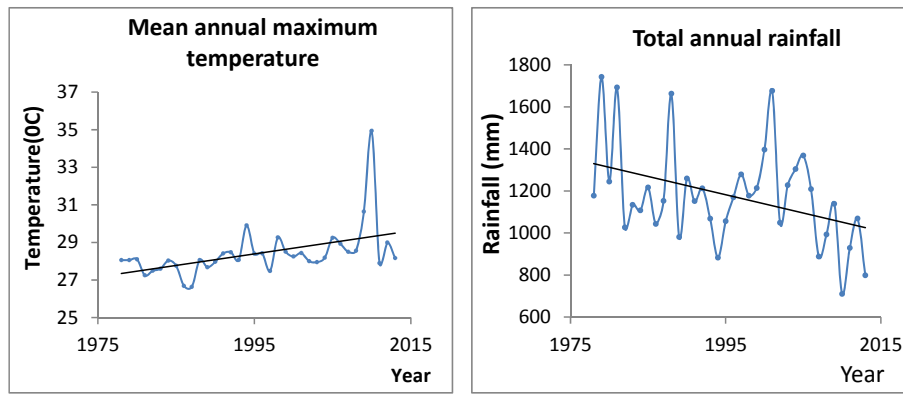


Fig. 3. Mean annual maximum temperature and total annual rainfall (1978–2013). Source: Department of Hydrology and Meteorology, Kathmandu, 2014.

Table 2
Representation of research participants from different groups.

Caste	Total	Female	Male	Other stakeholders	Number of participants
Brahmin	48	16	32	National level	MFSC (2), MOSTE (2)
Chhetri	8	2	6	District level	DFO (2), FECOFUN (1)
Indigenous	7	5	2	VDC level	Political leader (1)
Dalit	14	12	2		VDC staff (1)

MFSC = Ministry of Forest and Soil Conservation, MOSTE = Ministry of Science, Technology and Environment, DFO = District Forest Office, FECOFUN = Federation of Community Forestry Users Nepal, VDC = Village Development Committee.

Data collection began with in-depth interviews in different hamlets, following with identification of issues not answered through interviews. Most of the disadvantaged considered themselves not knowledgeable enough to talk about social and economic issues. Symbolic gestures of participants, who refused to be interviewed on the grounds of not being capable to talk to outsiders, indicated a need for a more nuanced analysis of vulnerability.

We ensured the concerns of marginalized people were fully assessed by conducting ten FGDs with marginalized groups and four FGDs with other participants including farmers. Different issue became apparent in different groups. The same set of questions was developed for focus group discussion prior to data collection (appendix 1) but as we found differentiated issues/priorities in different hamlets and in different socio-economic groups, we had to adjust some questions while maintaining a common core of questions in marginalized groups (appendix 2).

FGDs also provided opportunities to validate information given by individual interviewees. Participants were encouraged to interact with each other and discuss how they cope with climate change impacts and what impedes their autonomous adaptation as well as how vulnerability and adaptive capacity are differentiated among different groups based on their wealth status, caste/ethnicity and gender. As FGDs may pose the risk of some participants being overly assertive in influencing the overall discussion (Boateng, 2012), we conducted some FGDs selecting the participants from pre-existing groups of people who have lived, worked or socialized together. However, being aware that conducting FGDs in pre-existing groups might preserve the existing power relations instead of challenging them, we also conducted three FGDs with people from across different socio-economic and ethnic groups and observed the differences.

People's involvement in different activities (household, water fetching from pond/tap, farm, social events, CFUG activities, and local rituals) was closely observed during many transect walks across the village, and in formal and informal gatherings. This also provided an opportunity to observe how different lands have been

allocated for different purposes, the impact of drought on agricultural lands and also to crosscheck the information provided by respondents during interviews.

3.3. Data analysis through abductive reasoning

All interviews and discussions were conducted in Nepali and audio recorded. Interviews were transcribed and translated into English before coding and analysis. Qualitative data analysis software (NVivo 10) was used to organize the unstructured qualitative data, including coding and categorizing codes into broader themes (Table 3). Coding was applied to all the transcripts at three levels (Strauss and Corbin, 1990): initial/open coding, focused coding and thematic coding. The transcribed interviews were coded line by line during the initial coding process and open coding continued until no further new codes emerged (Charmez, 2011). At the second level, open codes were re-examined before developing themes in a third level of coding, following the abductive reasoning approach.

4. Results

In this section we present an empirical analysis of how pre-existing socio-cultural practices have produced differentiated adaptation responses and outcomes across multiple sections of society. In the first sub-section, beginning with climate change impacts, we present three common adaptation strategies adopted across Panchkhal. In the second sub-section we analyse emergent themes that describe socio-cultural hierarchies and forms of cultural codes (*doxa*) observed in Panchkhal. Finally, we analyse how these affect adaptation in different parts of society.

4.1. Climate change impacts and adaptation strategies

Climate is one of the drivers of change in Panchkhal, through its effect on the livelihoods of people living in the village. People talked about the significant effect on their livelihoods of

Table 3
Examples of how different codes were categorized into themes.

Themes	Frequency of codes	Implication to marginalized group
Human relocation	Malaria eradication (n = 11), relocation to lower areas (n = 27), in-migration (n = 5), out-migration (n = 26), seasonal migration of Dalits (n = 14)	Relocation to Besi areas is not an option for Dalits and poor due to unaffordability. Out migration enhances adaptive capacity of wealthier families, while seasonal migration to brick factory reinforces existing vulnerability of Dalits
Occupational dynamics	Subsistence and commercial farming (n = 67), Off seasonal vegetable production (n = 69), Artisanal occupation (n = 14), brick factory (n = 14), market access (17)	Shifting towards adaptive occupation is an option only for wealthier households. Commercial farming is not an option for Dalit. Dalit shifting towards seasonal migration to work in brick factory has further reinforced their existing vulnerability.
Collective action	Farmers group (n = 15), micro finance (n = 35), Community forestry user group (n = 75)	Limited access and participation of Dalits in those activities. Absence of Dalit men from villages has hampered collective action in Dalit village.
Social isolation	Untouchability (n = 14), isolated community in marginalized land (n = 7), restricted social exchange (n = 3), social stigma of being lower caste (n = 11)	All the codes in this theme were extracted from interviews with Dalits. Dalit occupying only marginalized land (with no irrigation access), intra communal collective action is hampered by untouchability and caste based hierarchy.
Financial authority	No or limited decision making power (n = 30), inheritance of ancestral property to sons, no access ownership over resources (n = 30)	Woman having lesser rights over resources is typical example of this theme. Women as they are not able to decide on changing occupation, it has hampered their adaptability.
Knowledge based supremacy	Male dominated advisory committee (n = 37), approval from men in executive committee (n = 5)	Men dominating the decision making process is based on the perception of them being knowledgeable than women

increasingly erratic patterns of rainfall. “*Paani ko abhav nai ho*” (English translation – ‘*it obviously is water scarcity*’) was the common response during interviews when asked what was the main problem associated with their livelihoods. Prompting was not required to elicit responses related to drought and its impact, as most of the respondents automatically linked their increased livelihood workload to water scarcity. Delays in the pre-monsoon rain that affected maize sowing and the erratic patterns of monsoon rains that affected rice cultivation were among other climate related impacts that people experienced in Panchkhal. Climate related impacts other than drought included frost, which resulted in the failure of potato production in the winter of 2013. This was experienced for the first time in living memory in Panchkhal.

Three adaptive strategies were identified under the themes that emerged from the analysis: human relocation, collective action and occupational change. These strategies are not always independent. One supporting the other is very common.

Human relocation included all dimensions of temporary or permanent movements, in, within or out of Panchkhal. Relocation within Panchkhal is the oldest practice of human adaptation, going back to before the eradication of malaria in the 1950s. The lower-lying land (*Besi* – Nepali for lower area) of Panchkhal is preferred for agricultural activities as it receives better solar exposure, has more fertile soil and better access to water for irrigation. However, this area was not habitable until after malaria was eradicated. The current residents of the lower lands of Panchkhal used to live in the upper areas (*Gaun* – Nepali for upper area) such as Keraghari because it was colder and less susceptible to malaria outbreaks. People used to shift to the lower areas temporarily during winter, returning to their permanent settlements in the higher areas during summer. With the eradication of malaria, they moved permanently to the lower lands that are endowed with better water availability than higher altitudes for consumption and irrigation purposes. Currently, digging wells for household water consumption and drawing water from the Jhiku Khola River for irrigation are among the most prevalent adaptation responses in Panchkhal.

Another significant dimension of *human movement* in Panchkhal is seasonal migration, a common adaptive strategy among Dalit people. The brick factories in the city have become popular destinations for them to work. The brick factory is closed during the monsoon season and opens in winter when water scarcity increases in the village. Evidence of this seasonal scarcity for Dalit people was apparent during transect walks, where it was common to come across people carrying water vessels from the distant *Padhero*, a few

kilometres away. This clearly indicated that the foremost struggle is to fulfil water needs for drinking and cooking purposes. Irrigation is a secondary concern because they have little land.

In contrast to the permanent movement to the lower areas this seasonal migration, while providing alternative income, had negative impacts on human and social capital. During the two field visits, it was noted that participation and representation of Dalit men in social activities and networks across the village was very low, owing to their seasonal absence from the village for 3–6 months per year. Consequently, some Dalit families considered that this seasonal migration hampered their long term adaptability. For instance, a Dalit couple who used to earn a large part of their livelihood during their seasonal migration to the brick factory said: “We realized that seasonal migration was interrupting our children’s education, as we used to take them with us or leave them with relatives; in either case, they were being negatively affected, they couldn’t perform well in school so we decided not to work in the brick factory, but then we couldn’t go up economically” (Participant -106). The wife further added, “We would have bought some land, had we continued our work there” (Participant – 78). Nevertheless, their neighbours who still work seasonally in brick factories have not been able to translate this financial prosperity into improving quality of life, for example by building a better house or buying land in areas with better access to water. Most of the Dalit respondents agreed that seasonal migration only offers temporary help with their livelihoods, saying for instance: “Working hard for 3–6 months does not provide enough to survive for a year and we need to rely on salary advances, which we get during the festival season, and which bind us to work for the next season. This is how the life runs here” (Participant – 79, a Dalit woman).

Another form of movement is within-region migration. Panchkhal is a popular destination for people from the surrounding villages. While people are leaving Panchkhal for the city, the number of people moving to Panchkhal is increasing every year. When asked about their motivation to relocate to Panchkhal, common responses among respondents were vegetable production potential, better transportation and market access and cheaper land than in the city. However, most of the new inhabitants indicated that they cannot afford to buy *Khet*⁶ land, so they buy *Bari* land and rent irrigated *Khet* land from families who do not practise

⁶ Categories of land (*Khet* and *Bari*) are based on the availability of water for irrigation. *Khet* is irrigated land while *Bari* is dry land.

agriculture because, either they have moved to the city for better opportunities, or they do not require agricultural income as they receive other sources of income. Some landowners observed that letting tenants lease their land is a safer source of income than cultivating it themselves. The reasons for this included erratic rainfall, increased expenditure for labour, pesticides, fertilizers and improved variety of seeds.

In effect, this increases toil and climate risks for landless people or people who move. They practise agriculture that sometimes only earns enough to pay the rent for the leased land and sometimes not even enough for that. In response, when asked how they cope when the income from leased land is not enough to pay rent for the land, one woman farmer said:

There were many instances as such mainly due to the uncertain climate conditions. Last year the entire potato crop was damaged by frost, we are in debt now as we couldn't pay the money we borrowed from one of the micro-finance organizations. For this reason, we prefer doing Adhiya⁷ (sharecropping) to Thekka. However, Thekka contract is preferred by farmers where there is certainty in production but with increased occurrence of erratic rainfall in Panchkhal, it is risky to rent in Thekka. (Participant – 39).

Farmers who rent land through *Adhiya* or *Thekka* also have fewer incentives to invest in measures to intensify production or manage climate risks compared to owner-cultivators.

The second adaptive strategy we identified was **occupational change**. We identified multiple facets of this theme, including complete shifts or innovation in existing occupations through technology and product diversification. Historically, even before malaria eradication, some parts of lower Panchkhal area were occupied by Danuwar, a group of indigenous people who lived traditionally as fishermen. Today Danuwar have become farmers, well-known for their hard work in farming activities in the contemporary Panchkhal. “*We were fishermen. Who knew we would practice agriculture today?*” said a Danuwar farmer (Participant -64) working in his field during a transect walk. This was not really by choice, as the most common response in relation to what triggered the occupational change among the Danuwar was “*With the agricultural expansion and excessive use of chemical pesticides, fishes from this area became extinct*” (Participant – 64). Most of the responses reflected the major changes in their livelihoods following the extinction of the fish. The onset of fish extinction was linked firstly with intensified agricultural activities such as excessive use of chemical pesticides and fertilizers that polluted the local streams and secondly, with decreased rainfall and the subsequent drying up of local streams and creeks. Some stories were told of how other factors, such as relocation of other people to lower Panchkhal, have affected the capacity of Danuwar people to adapt in the longer term:

With malaria eradication, when people from Gaun were relocating to Besi, our grandparents, parents and even we began to sell land at very cheap price. Soon after finishing the money and local extinction of fishes from local streams and creeks, we had to opt for some work to sustain ourselves. Having no specific skills, we started working in farmland (which was mostly sold by us) as labourers. We gradually shifted towards practicing the learnt skill as farmers

leasing the land we sold previously – (A senior member of the Danuwar community, Participant -65).

The majority of Danuwar people now practise agriculture and they are among the most active vegetable growers in Panchkhal. Another common observation among respondents was that, with vegetable production, most of the Danuwar have been able to buy more land for cultivation and built houses in Tamaghat Bazar.

Adjustment in agricultural practices is another common dimension of occupational dynamics which is very common among the farmers of this area. The use of hybrid and drought tolerant varieties of seeds, drawing water from Jhiku Khola using a pump and using chemical pesticides are among practices commonly adopted by farmers. As most of the farmer respondents stated, “*Using hybrid and improved varieties of seeds is due to uncertain climate conditions*”. For instance, delayed pre-monsoon rainfall has significantly affected maize production because sowing is delayed. As an adaptive response, farmers started using hybrid varieties because they take three months to mature compared to local varieties, which take six months. Later it became common practice to use hybrid seeds, triggering the extinction of local varieties from Panchkhal. Adoption of new techniques in agriculture was to some extent reinforced through mutual association among farmers. “*If something is growing well in my field there will be people from the entire village coming to ask what I used in my crops*” said one of the well-known farmers (Participant 26) in Lamidihi, Panchkhal. Similar cultural norms of some cultural groups working together in Nepalese society have been acknowledged widely in many development endeavours, and adaptation to changes in climate is no exception.

This leads to the third adaptive strategy, **collective action** which includes community based forest user groups, farmers’ groups, sharing information about new adaptation techniques with neighbours, borrowing money, establishing micro-finance co-operatives. Many villagers echoed the words of one participant - “*Without having support from relatives, neighbours and friends, we won't survive during hard times*” (Participant -29). Farmers groups have been set up for multiple purposes such as disseminating information in new agricultural techniques and raising funds to use during hard times. As one of the leading farmers said, establishing a farmers group has helped them unite during periods of stress and helped them take necessary steps. One of the lead farmers explained how staying in a group helped them. “*When the whole village suffered from potato crop losses due to unexpected frost in 2013, our group raised concern strongly and we successfully drew attention from government. Consequently we were given compensation at least to cover our investment*” (Participant -66).

In general, there was no preference for any particular adaptive strategy over any other among the participants, with each strategy having importance for those who adopted it.

4.2. Social hierarchies & cultural politics affecting adaptation in the field of natural resources

Symbolic differentiation based upon gender, caste and economic condition were observed in multiple instances. Historically persisting hierarchies are maintained through different socio-cultural practices and rituals. *Social isolation, financial authority and knowledge based supremacy* were three broad themes identified in this study. These themes define the interface (Fig. 4) of how, and in what ways, different symbolic hierarchies are maintained through rituals and practices that hamper long-term adaptability of marginalised groups.

The first theme of **social isolation** is relevant to understanding

⁷ Most of the farmers found fewer incentives in *Adhiya* (sharecropping) as they have to give half of their production to the landlord. Landlords contribute to some of the cost of inputs, usually half the cost of fertilizer, but this does not cover investments used to improve productivity such as water pumps, labour, seeds etc. In *Thekka*, rent (in terms of money) is agreed prior to production.

the dimension of caste in symbolic hierarchies. For instance, the construction of new hamlets in any Nepalese village is based on the caste and ethnicity of the settlers. In Panchkhal, three hamlets called *Salleni Gaira*, *Mayal Pani* and *Kera Ghari* are characterized as having marginal and less fertile land and the main residents are Dalit people. Isolation is not limited to geography but is even stronger in terms of social and cultural isolation. Untouchability results in social isolation, hampering prospects for collective action.

Isolation has hampered the adaptability of the Dalit people because it interacts with, and reduces access to, the adaptation strategies described above. Despite living in an area potentially suited to vegetable production and close to the market, Dalit people are not benefiting from this potential advantage. A single woman, answering why they do not produce vegetables like most of others do, responded: “We don’t have any access to the irrigation canal in our hamlet like the *Besi* area, and rain doesn’t fall when we need it most and in the last decade, rainfall has become more erratic than ever before” (Participant -79). And another woman added “the land we occupy is marginal (locally called *Bari*) and not as productive as *Khet* in *Besi*” (Participant -78).

These quotes represent a common situation among Dalit respondents. In response to the question of why they do not relocate to the *Besi* area (currently more developed than *Gaun*, in terms of accessibility to irrigation, transportation and schools) as others have done, one female respondent said: “Now it is not that easy, as prices of land in lower areas (*Khet*) have gone up. It was easier to shift to the lower areas in that time as it wasn’t this expensive” (Participant -80). Another woman in FGD responded “we used to follow traditional artisanal occupations such as shoe making which did not require us to relocate to other areas” (Participant -67). That was a common situation for Dalits as they bartered their services with Brahmin and Chhetri. In return they collected grain as remuneration from upper caste people practising agriculture. The relationship between them was not considered equal and even now some Dalit people call them *Bista* (Nepali translation of ‘patron’). Lack of respect for artisanal work was the reason Dalit left their traditional occupations. “We felt our work is making us look inferior and we began to opt for alternative occupations” said an old Dalit man (Participant - 68). Some of the respondents also stated that the stigma associated with social categorisation of their occupation is one of the reasons to opt for seasonal migration.

The importance of collective action as a socially accepted adaptive strategy in Panchkhal is further confirmed by expressions of how weakened collective action across the hamlets has hampered overall development in *Keraghari*, *Mayalpani* and *Sallenigaira*. “Working collectively is very important to ensure overall

development including water availability in our premises, while it is very rare to act together with other hamlets. Moreover, as most of the people leave the village during dry periods, there will be no initiation for any collaboration with other hamlets” said a Dalit woman (Participant -78), who is voluntarily involved in multiple social activities such as community forestry and micro-finance. As she pointed out, the absence from the village of young and active people who have gone to work at the brick factory has affected the overall developmental endeavour in hamlets such as *Mayalpani* and *Sallenigaira* – “There are only a few who voluntarily contribute towards developmental works such as lobbying and drawing annual budget allocated for our hamlets” (Participant - 78).

Financial authority describes the differential access to power and financial resources based on gender. In Nepalese society, the symbolic domination by men is primarily related to their authority over resources. The inheritance of parental property by the son, women moving to the husband’s house after getting married, changing her surname to his and adopting his family’s norms also symbolize male domination over women. The socio-cultural practice of women obeying their husbands as household head without question persists in Nepalese culture and Panchkhal is no exception.

While, the formation of farmer groups was a popular collective action strategy among women in Panchkhal, some women had limited access to such platforms. “My husband earns enough and he doesn’t like me seeking any support from outside” (Participant -23) said a woman from a privileged Brahmin family in response to why she does not participate in any of these activities. It is very rare to find a rural Nepalese woman speaking out against her husband like this, but it was indicative of her husband’s control. Evidence of financial authority was observed in many women’s interviews. For instance, one woman farmer was dissatisfied with her agricultural occupation due to the financial losses they had to bear from erratic rainfall and the increased prices of seeds, pesticides, fertilizers and labour. But her husband, who does not contribute much to the farming activities, would not agree to change their occupation. She added, “in order to compensate these losses, I have to work harder in the field” (Participant -36).

Knowledge based supremacy is the third theme that helps to explain the multiple facets of symbolic power exercised by the community elites and public officials. The opportunity to acquire higher education in rural Nepalese society is unevenly distributed among different social sections: men and women, rich and poor, upper castes and Dalit. The division of occupations based on caste is one of the drivers that has historically endorsed unequal access to education. For instance, a young *Danuwar* man working in the field

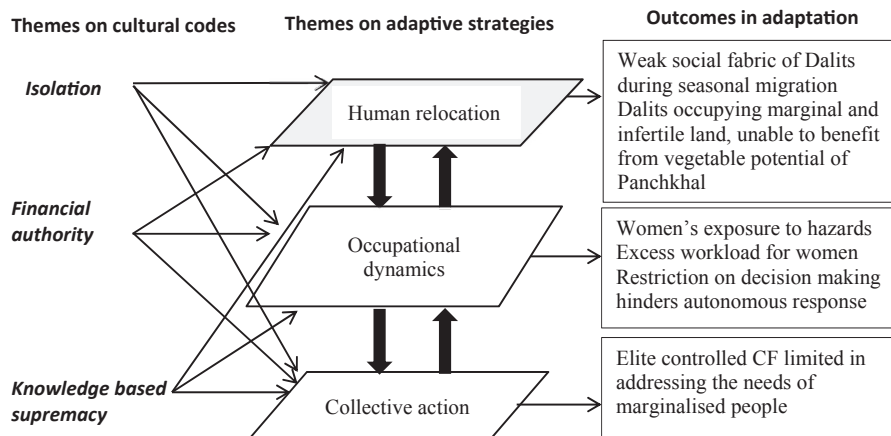


Fig. 4. Complex interaction between symbolic domination and adaptation strategies.

said: “We feel like we were born to dig and cultivate land”. Girls are usually encouraged to focus on household activities such as cooking and washing. During morning transect walks, a group of Danuwar girls was always found gathered at the *Pandhero* (Nepali for a communal water fetching spot). In response to why they were not at school, one of them responded: “We support our parents by taking care of household activities so they can work in the field”. Another added: “The whole morning is spent in queuing up for water, and it is already late to go to the school” (Participant 71).

Knowledge-based supremacy also affects the adaptation strategies of the marginalised in their participation in the community forestry user group (CFUG). The CFUG Executive Committee (EC) was reformed by transferring power to women in 2013, after being dominated by men for nearly two decades. Despite this improvement in the structural representation of marginalised groups, a genuine transfer of power did not actually happen. For instance, an advisory committee made up of previous EC members and therefore dominated by men was retained for consultation during any significant decision making. In this way, the men maintained their symbolic domination because they believed that they are more knowledgeable than women. Women respondents during the first field visit in 2013 appeared generally positive about having an advisory committee as they thought the men’s advice would help them. However, during the second field visit in 2014 (more than a year later), several women expressed dissatisfaction because their capability to manage the CFUG was questioned when they tried to change the harvesting rules to better reflect the needs of different groups. The EC also had to halt tree felling operations, due to multiple pressures from the male dominated elite groups.

These themes indicate that the adaptability of different social groups is hampered by socio-cultural, economic and political interactions across the multiple scales. Without understanding this complexity, adaptation policy cannot genuinely address the vulnerability of marginalised groups.

5. Discussion

This section discusses how vulnerability is produced and maintained in society based on the processes and consequences of adaptive responses made by people across Panchkhal. Our findings relating to adaptive strategies generally concurred with wider evidence of collective action (Adger, 2003; Ensor and Berger, 2009; Reid and Huq, 2007), human mobility (Agrawal, 2010) and adjustments in agricultural practices (Chhetri et al., 2012). In considering these strategies it is important to recognise the difference between adaptation and coping and how the same adaptation strategies have resulted in differentiated outcomes for different groups. For instance, the migration strategy is an act of anticipation of adaptation for Brahmin and Chhetri (usually from affluent families) while for the Dalit it is coping strategy as it is not generally helping improve their livelihood outcomes in the longer term. Anticipation as an adaptive response is common among the educated and affluent people in the community but it is not available to all in the community. Anticipation involves taking action now to minimize or avoid future impacts of climate change. For instance investment in children’s education is an act of anticipation but economic conditions and lack of access to land and resource and forced seasonal migration mean that it is not available to the Dalit community. Choices made by people largely depend on their capability, which is associated with gender, caste and wealth status. For instance, women’s engagement in agricultural activities is higher, increasing their exposure to hazards such as spraying chemical pesticides because they do not use any protective equipment. This represents an example of differential vulnerability. When asked about precautions, one woman said: “It doesn’t do anything I am used to it”

(Participant – 58). This exposure was, in most cases linked with them not being able to read the labels on pesticide bottles. Their inability to foresee the long term effects of present actions is undoubtedly increasing their susceptibility to future change. For wealthier families, sending children to the city for higher education, for instance, is largely an act to increase livelihood options and improve their capacity to deal with change. In contrast, seasonal migration to the brick factory and leaving children behind at a time that coincides with water scarcity in the village is a form of short term coping. Migrating to the city for seasonal work is increasing the vulnerability of Dalit people in the longer term by continuously putting them in a cycle of poverty, indebtedness and incapacity.

The dissonance between the context of social action (field) and the cultural preferences of social agent (*habitus*) provides an analytical space where we can investigate how and why vulnerability persists, with differential consequences for different groups in the community. For instance, despite several legal reforms being promulgated in the field of policy in order to promote equality among gender, caste and other classes, discrimination has persisted through socio-cultural belief and value systems (*doxa or cultural codes*). Despite the emergence of the Maoist political movement, which espoused a philosophy of broader empowerment, symbolic differences of gender and caste persist in Nepalese society (Nightingale, 2011). However, addressing vulnerability through ensuring structural equality does not suffice in supporting adaptation efforts because social position, which is both visibly and invisibly constructed, produces different types of vulnerabilities that persist over time and vary with place.

While changes in policy are being considered to address these problems, they are generally not likely to trigger proportionate changes in the disposition or attitudes of people to their position in society. People are resistant to change to better adaptive strategies because of multiple impediments. For example Dalit people, even if they want to stop going to work in the brick factory, are not able to stop because in the absence of alternative opportunities, they are obliged to borrow and use their salaries in advance to survive. This does not allow them to educate their children and hence maintains a cycle of marginalization. With the rapid expansion of suburbs in Kathmandu city, the demand for bricks is soaring, and with no other opportunities for work in their locality this further reinforces the marginalised state associated with path dependencies (Mahoney, 2000) that characterise seasonal migrant workers. Marginalised people often blame themselves for not being able to study or educate their children. Few are aware that their status at birth increased their vulnerability— “We’re gradually getting to know how we were made vulnerable in this society” (Participant –78) a Dalit woman expressed during a FGD.

Anticipation is not always possible because while an individual may be willing to act and plan for the future, implementation often requires involvement of multiple actors such as other family members, neighbours or governments. The historically determined feudalistic society has shaped the cultural codes that reinforce authority, also evidenced in previous studies (Nightingale and Ojha, 2013). One of the most common responses from across the non-Dalit key informants about what is hindering overall development of the Dalit community was the belief that: “the rest of the year they spend binging on alcohol, and they don’t invest their income in long term activities including education of their children. They neither save their income for the future nor do they invest in any other activities to support unforeseen events” (Participant – 66).

These internalized perceptions about Dalits represent a form of symbolic violence in the wider social domain and do not represent realities; such misconceptions not only exacerbate suffering but reinforce existing social inequalities. Many encounters with alcoholic-affected Dalit men and women during transect walks

indicated their passive resistance to participation in any social activities, further maintaining the existing social isolation and domination.

The need to empower marginalised people to address vulnerabilities has generally only been recognized in the academic field (Lachapelle et al., 2004; Watts, 1991) with limited translation into relevant policy and practice. When asked why the marginalized Dalit/Danuwar people do not seem to benefit from current institutional mechanisms such as the VDC fund for drinking water, a local leader responded: “*It is their fault they are not able to utilize what is being given, it's their choice to go to the brick factory*” (Participant –60). An interviewee from the Federation of Community Forestry Users Nepal (FECOFUN) replied similarly: “*If they can't change themselves, they won't be able to survive; it has got nothing to do with social inequality*” (Participant –104). This indicates how the political economy in this region is still largely dominated by the concept of social Darwinism (Ribot, 2011), further reinforcing the marginalization of certain ethnic groups.

Empirical data from the case study of Panchkhal presented in this paper indicates that vulnerability is a complex notion, because it is produced through multiple interactions of social, cultural, economic and political processes happening at different times and places. Climate change is reinforcing existing vulnerabilities, produced through these socio-cultural-political interactions. “*Not only climate, almost everything is changing in this locality; some things are changing faster than others*”, said one of the key informants during an interview (Participant – 46). “*Usually these changes bring prosperity to the wealthy and powerful while the same changes bring drudgery to the poor and powerless people*”, he further added giving examples such as improved market access that has made the iron tools such as *hasiya* (Nepali name for grass cutter) more readily available, but has negatively affected local blacksmiths. Despite these occupations (for example blacksmiths, shoemakers, tailors) being less affected by climate change, their vulnerability higher for other reasons. For example, the use of different technology has impacted on the demand for products from Dalit occupations, with the increasing use of tractors for ploughing farmland reducing job opportunities for labourers.

The identified themes of *isolation, financial authority and knowledge based supremacy* are drawn from deep cultural, historical socio-political dimensions that indicate a need for a more nuanced consideration of vulnerability. Socio-political power relations across multiple scales and social position based on their caste, economic class and ethnicity result in differentiated vulnerability (Blaikie and Brookfield, 1987; Blaikie et al., 1994; Nightingale, 2006; Sen, 1981) and indicate how power relations are enacted through existing social hierarchies. Using Bourdieu's field of practice, particularly through Cultural codes (*doxa*) and social agents (*habitus*) we have shown that differentiation in adaptation strategies among different social groups reinforces pre-existing social hierarchies based on caste, gender and economic condition.

Addressing vulnerability should begin with a deconstruction of historical, cultural and socio-political processes in order to arrive at the actual underlying causes of vulnerability. Climate change policies in Nepal are generally technocentric and deterministic (Ojha et al., 2015). When asked why socially constructed vulnerabilities are not considered in climate adaptation policies, a climate adaptation expert responded: “*We need to acknowledge people's perception and experiences but it needs to be backed up by scientific approaches of assessing vulnerability, drawing upon climate conditions*” (Respondent – 107). This indicates that while the respondent acknowledged vulnerability is socially constructed, it is not considered in policy making and implementation. This is likely to intensify the impacts of climate change on marginalized groups. “*Criteria for getting international adaptation funding are underpinned*

by conducting standard and science based assessment of vulnerability” the same respondent added. This clearly indicates that the requirement for funding from international bodies is driving the perception/attitudes of policy makers and practitioners, limiting the prospect of changing the adaptation potential of marginalized communities in Nepal. The problem starts at the global scale and affects how people might adapt at the local level.

6. Conclusion

Drawing on a case study from the mountains of Nepal, this paper has demonstrated that the social position of people, which is historically rooted in a patriarchal and feudal society, results in differentiated ability of people to perceive, anticipate and respond to climate change. We illustrated these social roots related to cultural politics and social dynamics, and how they affect vulnerability and adaptation responses of the people living in this region. A key finding is that socially marginalised people are more vulnerable to climate change mainly because of the existence of an uneven distribution of power, and also because of their lack of ability to recognise political inequality and cultural domination in the society. Such processes of marginalisation are embedded in multiple and intersectional forms of differentiations based upon gender, caste and economic condition. We identified three distinct ways in which the processes of marginalisation are embedded in terms of cultural practices, affecting the way people use different adaptive strategies to address climate change.

Three key elements - *social isolation, financial authority and knowledge based supremacy* - underpin social-cultural processes that reinforce the orthodoxy of the existing societal hierarchy which in turn leads to differential vulnerability. We used Bourdieu's theory of practice to understand how differential vulnerability and capability to adapt is produced through historically rooted social and cultural dynamics in the society. For instance, the tradition of Dalit people to live in separate clusters - a practice under the prejudiced notion of untouchability - has not changed despite multiple changes occurring in the fields of policy and practice to abolish such cultural discrimination. As a consequence their participation in the collective space of development has been hampered, further reinforcing their state of marginalization. Similarly, financial authority limits women's power in decision making at household level, constraining their capabilities to respond to environmental shocks (Bhattarai et al., 2015). Lastly, an assumption of superiority based on the perception that certain groups of people in the society are more knowledgeable has hampered the adaptation of marginalized groups. For instance, despite the outward transfer of control to females, retaining a male-dominated ‘Advisory Committee’ in the CFUG has maintained male domination over the management of collective resources and hence limited the prospects of adaptation achievable through institutional development.

Such deep cultural and historical underpinnings of vulnerability mean that social agents often fail to recognise and question these at every level of decision-making, from the local through sub-national to the national level. As a result, many of the agency-focused adaptation strategies and policy solutions promoted by development agencies have failed to generate socially inclusive adaptation outcomes. This finding suggests that a radically new approach to catalysing adaptation is necessary in the context of a highly heterogeneous society like Nepal where adaptive behaviours can result only from a transformation of existing power relations, knowledge based supremacy and reconfiguration of the cultural economy of symbolic power.

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Appendix 1

Guiding themes to facilitate focus group discussion

- Socio-economic condition and livelihood options
- Dependence on common property resources (e.g. forest)
- Does the different dependence on forest lead to differentiated adaptive capacity
- Accessibility to the resources (equal or equitable access to the resources at household and community level)
- Participation on community organizations and activities (e.g. Community forestry user group, farmers group)
- What makes people eligible to become executive committee member of CFUG?
- Satisfaction/dissatisfaction towards current institutional arrangement of CFUG
- Factors that affects the adaptive capacity of the marginalized people
- Relation between dependence on forest with differentiated adaptive capacity
- How the existing situation can be improved
- How can community institution ensure adaptive capacity of the marginalized and poor?

Appendix 2. Details on participants and themes for focus group discussion

Number	Place	Date	Description and number of people	Issue discussed with group
FGD 1	Kafledihi	27th May, 2013	Landless women (n = 3)	Challenges women face in the leadership role in community institution
FGD 2	Lamidihi	28th May, 2013	Women farmers (n = 3)	Impact of climate change in agriculture and ways to cope
FGD 3	Lamidihi	28th May, 2013	Women actively engaged in social activities (n = 3)	Role of women in social change in Panchkhal, challenges and prospects
FGD 4	Tamaghat	29th May, 2013	Indigenous women (n = 3)	Reasons for dropping out school, career options
FGD 5	Mayalpani	4th June, 2013	Dalit women (n = 3)	Participation and decision making in social and economic activities, climate change issues, seasonal migration
FGD 6	Dulalthok	11th June, 2013	Indigenous women (n = 4)	History of landholding, occupational change, impact of climate in livelihood
FGD 7	Jantadihi	12th June, 2013	Men farmers (n = 3)	Trend of change in farming, impact of climate change, changing role of forest in farming
FGD 8	Bakhreldihi	14th June, 2013	Landless women (n = 2)	Sources of income, role of forest, what hinders their participation in social activities and decision making
FGD 9	Kafledihi	15th June 2013	Senior men across different occupation (n = 4)	Historical development of Panchkhal, livelihood dynamics across different socio-economic groups
FGD 10	Sallenigaira	28th May 2013	Dalit people (n = 8)	Livelihood options and forest role, seasonal migration, participation in CF decision making, dissatisfaction towards current institutional arrangement
FGD 11	Mayalpani	24th December 2014	Dalit women (n = 3)	Livelihood options, seasonal migration, climate change impact
FGD12	Bakhreldihi	5th August, 2013	People from across different social groups (n = 9)	Climate change impact mapping: changes in livelihood due to climate change, coping strategies, role of forest institution in adaptation
FGD13	Lamidihi	6th August, 2013	People from across different social groups (n = 5)	Historical trend analysis of climate change and its impacts upon their livelihoods
FGD14	Lamidihi	6th August 2013	Men farmers above 50 years old (n = 2)	Historical development of Panchkhal, livelihood dynamics across different socio-economic groups

FGD = Focus Group Discussion, Field visit (2013/2014).

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