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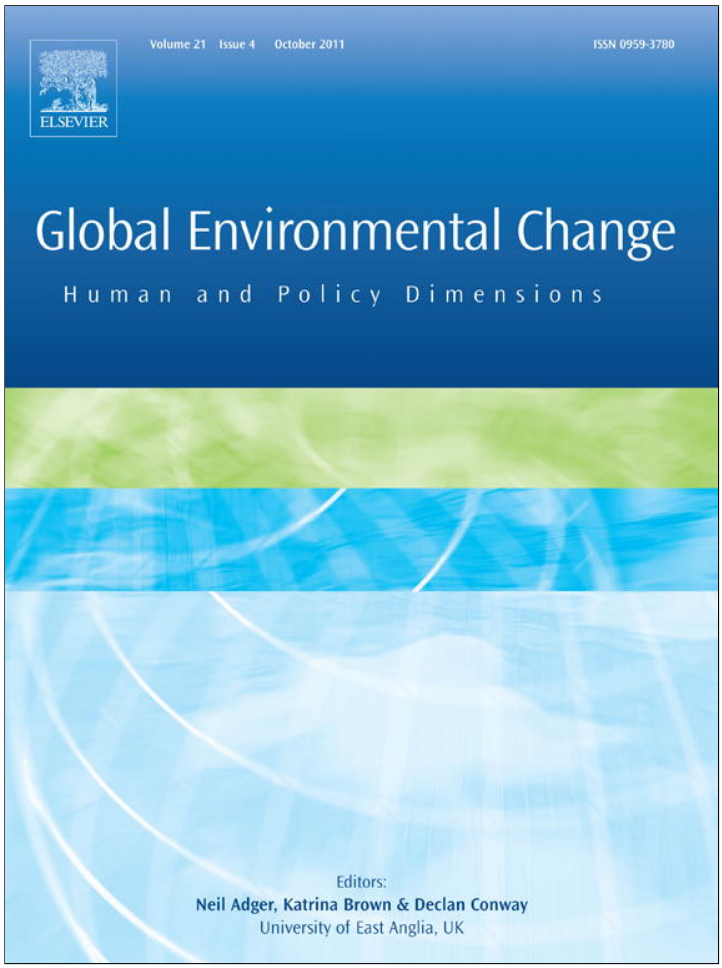

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Exploring social barriers to adaptation: Insights from Western Nepal

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ABSTRACT

As the challenges and opportunities posed by climate change become increasingly apparent, the need for facilitating successful adaptation and enhancing adaptive capacity within the context of sustainable development is clear. With adaptation high on the agenda, the notion of limits and barriers to adaptation has recently received much attention within both academic and policymaking spheres. While emerging literature has been quick to depict limits and barriers in terms of natural, financial, or technologic processes, there is a clear shortfall in acknowledging social barriers to adaptation. It is against such a backdrop that this paper sets out to expose and explore some of the underlying features of social barriers to adaptation, drawing on insights from two case studies in the Western Nepal. This paper exposes the significant role of cognitive, normative and institutional factors in both influencing and prescribing adaptation. It explores how restrictive social environments can limit adaptation actions and influence adaptive capacity at the local level, particularly for the marginalised and socially excluded. The findings suggest a need for greater recognition of the diversity and complexity of social barriers, strategic planning and incorporation at national and local levels, as well as an emphasis on tackling the underlying drivers of vulnerability and social exclusion.

1. Introduction

The interaction and organisation of humans, as social beings, are largely shaped by social processes and the institutions, norms and behavioural characteristics that influence them (Ostrom, 2005; Baker et al., 2006; Bisaro, 2007). As such, the social environment can play a significant role in prescribing how individuals choose, and are allowed to respond to shocks and stresses (Crawford and Ostrom, 1995; Jutting, 2003; Pelling and High, 2005; Agrawal, 2008; Adger et al., 2009a). With this in mind, actions taken to adapt to climate variability and change are likely to be shaped by overlapping social processes that govern adaptation action. In many instances these processes may act to influence or dissuade individuals from pursuing sustainable and logical adaptation, constituting an effective barrier to adaptation.

This study explores the characteristics and implications of social barriers to adaptation. To do so, we use an analytical framework to assess how cognitive, normative and institutional determinants may influence adaptation and adaptive capacity at the local level. The study looks at the role of various social institutions, such as caste and gender, in influencing responses to shock and stress in the Mid and Far-Western regions of Nepal. Seeking to explore the complex relationship between social processes, adaption action and adaptive capacity, the study gives a detailed account of the experiences of two rain-fed subsistence farming communities. In doing so, the study uses, builds upon, and contributes to recent literature on the social determinants of adaptation and adaptive capacity (De Venanzi, 2005; Grothmann and Patt, 2005; Pelling, 2005; Pelling and High, 2005; Löf, 2006; Hulme et al., 2007; Coulthard, 2008; Adger et al., 2009b; Deressa, 2009; Jones, 2010; Smith et al., 2010; Adger et al., 2005).

The premise behind this study is neither to identify, nor to quantify and rank each of the social barriers to adaptation. Rather, it seeks to expose and explore a number of significant barriers found within the two study sites. Indeed, it is hoped that the findings may form the basis for further detailed research into the determinants and implications of such barriers, in order to move towards an improved characterisation of adaptation and adaptive capacity.

In the next sections we explore the contemporary literature on limits and barriers to adaptation, the role of social institutions in adaption behaviour, and provide background into Nepal's context. We go on to analyse the influence of social barriers for adaptation action within two rural sites, and reveal how they influence adaptive

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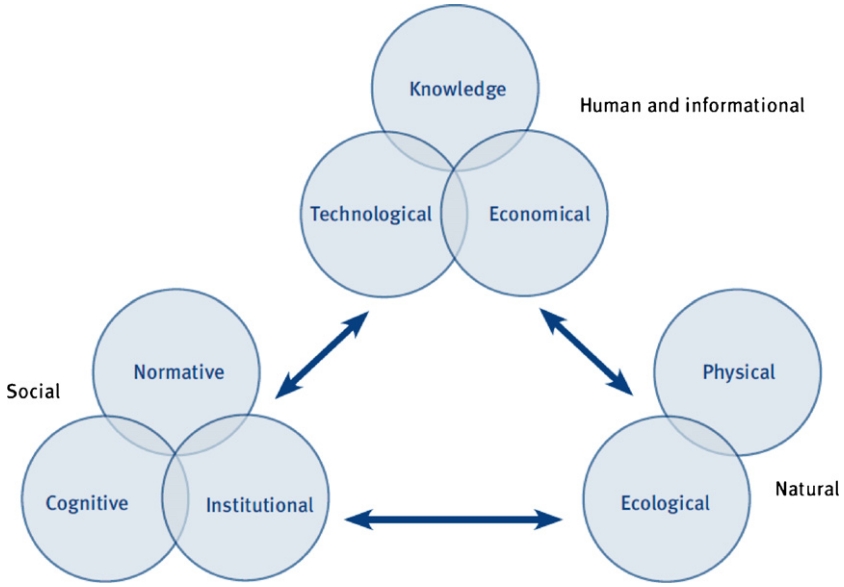

Fig. 1. Limits and barriers to adaptation and their linkages.

capacity at both the individual and collective levels. Finally, we situate the findings within the context of wider literature and highlight the associated implications for designing adaptation strategies.

2. What are the limits and barriers to adaptation?

While the term adaptation is widely circulated, it has no singular definition of universal application. At its simplest, adaptation within social systems relates to the processes people use to reduce the adverse effects of climate on their livelihood and well-being, and take advantage of new opportunities provided by their changing environment (TERI, 2007). For the purposes of this study adaptation is defined as '*adjustments in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities*' (IPCC, 2001: 72). Adaptation can be categorised more specifically into various types and forms: in terms of timing it can be 'anticipatory' or 'reactive'; in terms of planning and external assistance it can be 'planned' or 'autonomous' (Tol et al., 2009).

Adaptation actions are considered to be tangible alterations, or changes in decision-making environments, to enhance resilience or reduce vulnerability to the current or expected climate. In practice, adaptation actions tend to constitute '*on-going processes, reflecting many factors or stresses, rather than discrete measures to address climate change specifically*' (IPCC, 2007, 720). As such, adaptation actions, though prompted indirectly by climatic events, will often revolve around the complex interplay of other non-climate factors, for example, conflict over scarce resources or rising food prices (Adger et al., 2003). The capacity to adapt to variability and change is largely dependent on underlying structures of vulnerability such as levels of poverty, entitlements to assets and willingness to innovate, amongst others (Gupta et al., 2010; O'Brien et al 2004; Pelling and High 2005). Therefore, adaptive capacity can only be analysed within the context of wider development processes and interventions.

With adaptation high on the international agenda, there is an emerging discourse on the limitations of adaptation (Adger et al., 2009a,b; Smith et al., 2010). Through a review of the existing literature we separate the limits and barriers to adaptation into three distinct, yet interrelated categories (see Fig. 1). Ecological and physical constraints constitute the natural limits to adaptation. These are wide-ranging in practice, and can take many forms ranging from ecosystems thresholds and resilience, to geographic and geological limitations, and restrictions in resource allocation. For example, rapid sea level and temperature rises may present critical thresholds beyond which some ecosystem may not be able to adapt to self-regulate or radically alter their functional state and system integrity (USGS, 2009). Indeed, in the context of sustainable development, the limit of ultimate concern is the point at which vulnerable ecosystems will no longer be able to support and sustain human habitation (Barnett and Adger, 2003).

A second category can be broadly identified as human and informational resource based limits and barriers to adaptation. These limits are numerous, and can consist of, for example, the various spatial and temporal uncertainties associated with forecast modelling, low levels of awareness and information amongst policy makers of the impacts of climate change, as well as a lack of information of how best to facilitate and implement adaptation interventions (Adams et al., 1998).[1] Such barriers may arise due to a combination of knowledge, technological and financial limitations, with obvious implications for monitoring, forecasting and the designing of appropriate adaptation interventions. For example, while much of Europe and North America enjoy access to a wealth of observational data and climate modelled projections to inform adaptation policy, much of the Himalayan and Sub-Saharan regions are left with scant meteorological information and depend on coarse model projections (ICIMOD, 2009).

Thirdly, in recent years a number of studies have pointed to the significant role of social barriers to adaptation and adaptive capacity (Löf, 2006; Hulme et al., 2007; Adger et al., 2009b). Though broad in nature, examples of social characteristics that may influence, and in some cases dictate, adaptation actions include formal and informal institutions, normative behaviour, values, perceptions of risk, and self efficacy to name but a few.

2.1. Uncovering social barriers to adaptation

Social barriers to adaptation are concerned with the social and cultural processes that govern how individuals respond to climatic stimuli. Most adaptation literature makes the assumption that accepting the need to adapt follows from identifying and demonstrating the harm that will result from failing to act (Smith et al.,

[1] See Luers et al. (2003), Deressa (2009), and Gbetibou (2009) and for examples.

Table 1
Summarised characteristics of the three proponents of social barriers used in the analytical framework.

Proponent characteristics
(i) *Cognitive barriers* to adaptation relate to how psychological and thought processes influence how individual actors react in the face of existing or anticipated climate stimuli. There are a wide range of cognitive strategies that people may employ in face of current or future threats, ranging from denial and apathy, to helplessness, uncertainty and acceptance. How individuals and communities adapt to climate variability and change will depend on various thought process, values and ethics, in addition to how well they adapt psychologically (Wolf et al., 2010; Adger et al., 2009a,b; Lorenzoni et al., 2007). Consequently, these cognitive traits may influence the types of adaptation employed, if at all, and in certain instances can contribute to maladaptation.
(ii) *Normative barriers* to adaptation relate to the ways in which cultural 'norms' influence how actors respond to climate stimuli. Shared values and understandings can play a large role in prescribing how decisions are taken to respond and adapt to climate variability and change. In certain instances this may present obstacles to implementing effective and logical adaptation action (Jones, 2010). The role of norms and institutions in influencing adaptive behaviour is explored further in Section 2.2.
(iii) *Institutional barriers* to adaptation relate to the how the organisation and structure of interactions – both formal and informal – influence how individuals are permitted and able to adapt to climate variability and change. Institutions play a large role in determining the processes that govern and regulate access and entitlement to key assets and capitals needed to adapt to existing or anticipate climate stimuli. Various institutions can be seen to overlap and may serve to either enable or restrict an individual's capacity to adapt successfully – see Section 2.2.

Table 2
Illustrative examples of social barriers to adaptation.

Social barrier	Examples
Cognitive behaviour	- Belief that uncertainty is too great to warrant taking adaptation action now - Unwilling to accept the risks associated with implementing adaptation action - Change not yet seen as a problem; temptation to wait for the impact to be felt before reacting - Reluctance to accept outside aid and assistance
Normative behaviour	- Adopting historic and cultural response actions in relation to climatic stimuli that may be inappropriate in the context of future environmental change, or potentially maladaptive in the longer term - Unwillingness to deviate from traditional practices and adopt more appropriate and sustainable strategies
Institutional structure and governance	- Institutional inequities and social discrimination restrict access and entitlement to key resources and assets needed to adapt - Political and social marginalisation and discrimination - Lack of institutional flexibility

Adapted and expanded from excerpts by Jones (2010).

2010). This implies that individuals and communities respond directly to threats through adopting appropriate and rational adaptation actions and overlooks the wide range of social factors that may influence how adaptation actions are shaped. Equally, these social barriers may play a large role in encouraging individuals to avoid fully or partially accepting the possibility of unpleasant futures and the need to act immediately (Hamilton and Kasser, 2009).

The Intergovernmental Panel on Climate Change notes that, to date, '*social and cultural limits to adaptation are not well researched*' (IPCC, 2007, p. 737), acknowledging the scant attention within the climate change literature devoted to addressing social limitations thus far. Hulme et al. (2007) observe that social barriers largely operate at the individual and collective decision-making levels and generally reflect how a society is organised and structured, and the values it propagates. Social barriers vary widely within and between societies, can change over time, and may be overcome. Accordingly, social and individual factors largely *act as barriers to adaptation rather than as limits* (Hulme et al., 2007).

In order to further explore the implications of social processes, we use an analytical framework to identify three distinct, yet interrelated proponents of social barriers to adaptation.[2] Through this we separate and identify cognitive behaviour, normative behaviour, and institutional structure and governance, and assess how each facet may serve to restrict individuals or groups from seeking the most appropriate and sustainable forms of adaptation action (see Table 1 for summarised characteristics and Table 2 for illustrative examples). Important to note is that these three proponents by no means constitute all social barriers to adaptation. Rather, they serve as a useful starting point for exploring the complex nature of social barriers to adaptation and form the basis for the analytical framework used in this study.

2.2. Norms, institutions and opportunity structures

The definition of norm and institution varies considerably according to the discipline, field and user (Baker et al., 2006). Within the context of resilience and global change, Ostrom et al. describes norms as '*shared and internalised understandings by those involved, about the "do's and don'ts" involved in particular situations*' (Ostrom et al., 2002, p. 5).[3] As such, adaptation to climate variability and change within societies necessitates coordinated action and regulation-termed collective action. Institutions, hereby understood as '*prescriptions that humans use to organise all forms of repetitive and structured interactions, including institutionalised cultural rules as well as formal organisations*' (Ostrom, 2005, p. 1), play a central role in the coordination of information and action in the face of possibly diverging interests (Bisaro, 2007).

A useful concept in exploring the interplay and overlap of various social processes is the notion of 'opportunity structures'. Closely related to institutions, opportunity structures constitute the reactive space through which normative behaviour, values, and ontological stances may occur (Bennet, 2004). Opportunity structures are frequently made up of one or more institutions, each with their own rules, behaviours and norms.

Crucially, opportunity structures can be socially inclusive, paving the way for individuals to participate in and benefit from economic, political and social capital, or they may be exclusion-

[2] Hulme et al. (2007) define a '*barrier*' as a political, social, or behavioural obstacle to change. A '*limit*' to adaptation implies an absolute barrier, i.e. one that is unsurpassable.

[3] In contrast to rules, that are generally enforced, norms tend not be enforced in regular fashion by designated agents. Individuals involved in situations with participants who fail to comply with socio-cultural norms may often refuse to engage in reciprocity with those who break norms.

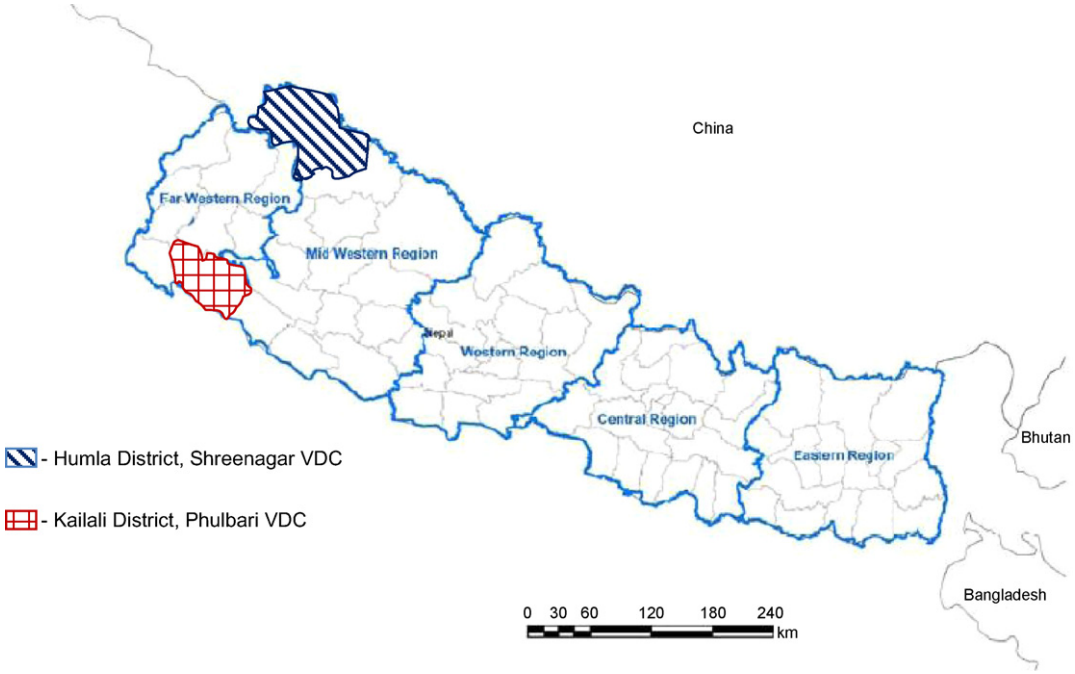

Fig. 2. Political map of Nepal identifying its five development regions and the two research sites.

ary. For example, the opportunity structure of lower caste Hindu women in parts of Western Nepal may consist of not only the various local informal institutional '*rules of the game*' that apply for women such as restrictions in employment and access to key resources, unequal access to education in comparison to males, and inability to participate in village meetings and politics. It may also include the appropriate behavioural norms that are afforded to the lower castes such as untouchability, and childcare and household duties; as well as those for religious belief systems, including compliance with Hindu rituals, values, and beliefs; abiding by caste structures; and dietary restrictions. Each of these institutional layers will combine to determine, to a large extent, the individual's behaviour, access, and entitlement in the face of climate shocks and stresses (Jones, 2010).

Within the context of much of South Asia, gender and caste are two distinct social institutions which exhibit and employ clearly defined norms, rules and values that have a large influence over the individual's behaviour in response to shock and stress (Bandyopadhyay, 2009; Löf, 2006; Gherghe, 2008). Chowdhury et al. (1993) provide a pertinent example of this in their analysis of gender and vulnerability to flooding across a number of south Asian nations, where local institutional restrictions typically prevent women from learning how to swim – as opposed to not being able to swim. In addition women feel obliged to wear clothing that inhibits swimming and are constrained in their access to emergency warnings and cyclone shelters due to cultural norms, increasing their vulnerability in the face of water-related hazards. This cultural barrier, arises not so much as a result of physical or physiological properties, rather it relates to the restricted opportunity structure afforded to women (Löf, 2006).

3. Case study

The study is situated within the context of Nepal, a country of 23.5 million inhabitants distributed across three ecological zones: Mountains, Hills and Terai; and five development regions: Eastern, Central, Western, Mid-Western, and Far-Western (see Fig. 2). Nepal is varied in its ethnic and social diversity, rich in its culture, and geographically assorted in its appearance. Agriculture forms the mainstay of Nepal's economy,[4] with some 77% of the workforce employed in some form of agri-practice, contributing roughly 40% to GDP as of 2002 (Khatri-Chhetri and Maharjan, 2006). Smallholders and subsistence farmers dominate the agriculture scene, constituting 78% of all agricultural holdings with an average holding size of 0.8 ha. The lowland Terai, bordering India, is the sole region in agricultural surplus, and thus is the principal region of production relied upon to supply the food-deficient hill and mountain areas.

The country's rich social and cultural environment is largely a result of considerable diversity. Its cultural heritage is made up of a multitude of ethnic, tribal and social groups and is represented in a variety of forms: be it language, literature, rituals, customs or beliefs (Burbank, 2002). With Hinduism practiced by roughly 80% of the population,[5] the Hindu caste system inevitably resides and permeates through Nepali society, particularly outside of urban settings (Bennet, 2004). Indeed, Thomas-Slayter and Bhatt (1994) observed that within a rural context, caste and ethnicity constitute the most important variables around which individuals, households, and communities aggregate for common action.

Nepal's caste system, much like that of India, is decidedly complex, stratifying social classes into a number of hierarchical endogamous groups. These can be broadly categorised into three distinct strata: Brahmin/Chhetri, Janajati and Dalit. The highest status within Nepal social order is reserved for the Brahmin and Chhetri. Brahmin are traditionally associated with the priestly order, forbidden by region from the consumption of alcohol and subject to a range of dietary restrictions. Somewhat below reside the Chhetri populace, traditionally the warrior caste. The Chhetri are the largest collective grouping, and largely dominate spaces of

[4] Despite a heavy reliance on agriculture as a means of livelihood, only 25% of total land are is cultivable. A further 33% remains forested, with the majority of the rest mountainous.

[5] The rest constitute 11% Buddhist, 4.2% Muslim and 3.2% associated with the indigenous Kirant religion.

Table 3
Selected socio-economic and geographical features of the two study locations.

Site location	Population	Literacy rate (%)	Caste groups	Primary source of livelihood	Elevation (masl)	Principle climate hazard
Shreenagar VDC	2,608	13	Brahmin/Chhetri; Dalit	Subsistence agriculture (*predominantly wheat and barley*)	2,500	Drought
Phulbari VDC	13,580	56	Brahmin/Chhetri; Janajati; Dalit	Subsistence agriculture (*predominantly rice*)	1,600	Flood

Source: GoN (2001).

political, cultural and economic power within Nepal. Although technically not a caste group, the Janjati are made up of a multitude of ethnic collectives. While not designated the same social stature as the upper castes, the Janajati fall under the '*unslaveable*' classification, and thus traditionally enjoy greater privileges than the lower strata.

Commonly categorised within the '*untouchable*' label, Dalits constitute the lowest social order of the caste system. Openly discriminated against, and devoid of much of the same liberties afforded by members of the upper castes, Dalits remain restricted in their opportunity structures despite the government's active attempts to address cultural subjugation, particularly in rural settings (Bennet, 2004). Although formally outlawed under the civil code of 1963–64, the informal institutions and opportunity structures that govern social behaviour are still very much dictated by, and built-upon the caste system and structures of the past (Prindle, 1979; Levine, 1987; Bennet, 2004; Karanth, 2004).

Aside from caste, gender is of significance in Nepali society. Historically allocated sole responsibility for housekeeping, child-bearing and household chores, women remain largely limited in their livelihood options as access to education, economic freedom and livelihood options remain overwhelmingly male-favoured, especially in rural areas (Bennett, 2005). A traditionally patriarchal social setting, and cultural assumptions governing women's role in society, serve to reinforce the restrictive and often discriminatory opportunity structure within which women are expected to behave (Niraula and Morgan, 2000).

3.1. Study location

3.1.1. Shreenagar VDC, Humla

Shreenagar Village District Council (VDC) is located in the Mid-West of the country in the mountainous Karnali region (Fig. 2). Renowned for its isolation and inaccessibility, no perennial form of road access exists within the entirety of the district. The village of Shreenagar is found at approximately 2500 m.s.l. with 421 households, housing 2608 inhabitants as of 2001 (GoN, 2001). At the district level, Humla receives approximately 800–1000 mm of rainfall per year, though accurate and reliable meteorological data for the district itself is lacking. The village is located on a steep slope, with poor soil and a dry climate limiting the potential for agriculture. Most livelihoods are engaged in subsistence cultivation, with wheat and barley the principle crops. Cultivation occurs in two circles through-out the year (summer and winter), and is entirely dependent upon rainfall and the natural environment (ACF, 2011). As a result, agricultural produce is particularly vulnerable to any variation and change in the climatic regime-whether gradual or swift. The primary climatic hazard with regards to livelihood and food security is the occurrence of drought, and variation in seasonal rainfall patterns (see Table 3).

Access to surrounding villages is achieved by small dirty paths/tracks, permitting no more than a single mule to pass at any given time. The only formal means of transportation comes in the form of irregular helicopter flights. Levels of socio-economic development are far lower than in comparison with the rest of Nepal, with only 13% of residents formally literate (GoN, 2001). Within the region a strong cultural heritage persists and heavily determines structural, cognitive and normative behaviour (Adhikari, 2009). Two of the three caste groups are found within the village – Brahmin/Chhetri and Dalit. The upper caste accounts for approximately 70% of the total community, while the Dalit form the remaining 30%.

3.1.2. Phulbari VDC, Kailali

Phulbari VDC is situated within the district of Kailali, one of the principal economic districts of the Terai region. Located in the Far-West of Nepal, the village is comprised of a total population of 13,580 inhabitants residing in 2420 households. As of 2001, the literacy rate stood at 56% of the VDC populous (GoN, 2001). While many livelihood options exist, practically all villagers are involved in agricultural cultivation of some form, with rice the staple crop.

Given the relatively flat topography of the district and close proximity to high mountains, Kailali is susceptible to flooding-flash flooding in particular. The district receives approximately 1800–2000 mm of rainfall per annum, 1600 mm of which falling during the monsoon periods (June–September) with an annual temperature range of 30.4–17.3 °C[6] (GoN, 2006). In comparison to Shreenagar, Phulbari is prosperous in its communicatory infrastructure with mobile telecommunication access and a small dirt track accessible by motorbike. Transportation during the monsoon period proves exigent, as river crossings require multiple ferry-trips by non-motorised wooden canoe. All three caste groups are found within the VDC.

3.2. The characteristics of Nepal's climate

While Nepal's share of global greenhouse gas emissions remains fractional at best,[7] it is one of the countries most vulnerable to impacts of climate variability and change (Khatri-Chhetri and Maharjan, 2006; Lohani, 2007; Rai, 2007; NCVST, 2009; Maplecroft, 2010). Threats posed by changes in temperature and rainfall intensity, distribution and variability are all marked in the observational record, as well as in simulated climate projections (OECD, 2003; GoN, 2004; Rai, 2007; NCVST, 2009).

For Nepal's agricultural systems, the main threats posed by climate change relate to changes in patterns of rainfall and increases in temperature at higher altitude. Faced with the likelihood of shorter rainfall episodes during the dry season, and higher phases during the monsoon, agriculture, and the livelihoods that depend on it, will no doubt be subject to severe impacts as a result (Alam and Regmi, 2004). Indeed, Mala (2008) suggests that a shift in climatic zones has already been observed countrywide, resulting in the extinction of various indigenous vegetative varieties. Given the lack of irrigative infrastructure and the subsistence nature of smallholder farming, Nepal's agri-systems are highly dependent on suitable climatic conditions and thus particularly vulnerable to climate variability and change (GoN,

[6] Using a rainfall baseline of 1971–2000, and a temperature baseline of 1978–2000.

[7] No reliable data currently exist, figures for the base year of 1994/1995 estimate CO_2 emissions at 9747 Gg (GoN, 2004).

Table 4
Projected multi-model GCM climate variables for Nepal and Western Nepal.

	Nepal country-wide			Western Nepal		
	2030	2060	2090	2030	2060	2090
Change in mean temperature: annual (°C)	+1.4	+2.8	+4.7	+1.4	+2.8	+4.0
Change in frequency of "hot days": pre-monsoon (%)[a]	–	+25	+43	–	+26	+40
Change in monthly precipitation: annual (%)	0	+4	+8	0	+4	+3
Changes in precipitation as heavy events: monsoon (%)	+2	+7	+16	0	+2	+6

Changes are relative to the mean 1970–1999, run using the A2 scenario.
[a] 'Hot days' taken as hottest 5% of days in period 1970–1999. Source NCVST (2009).

2004). Accordingly, success of crop production is "almost entirely linked with the weather condition" (GoN, 2008, p. 48).

Analysis of data collected by the government's Department of Hydrology and Meteorology suggests that the average temperature for Nepal, as a whole, has increased at a rate 0.06 °C per annum over the period of 1977–1994 (Shresta et al., 1999). A similar such pattern is observed in maximum temperature levels, with rates of increase noticeably higher at altitude (Rai, 2007). Moreover, shifts in rainfall intensity have been noted over the same period of time, with some indication of increases in monsoon precipitation in the country (Shresta et al., 1999).

One particular barrier in interpreting the observational record for Nepal is a severe lack of reliable metrological and hydrological data. Many of the temperature and rainfall records have large gaps in recording. Nepal also suffers from sparse availability of accurate weather stations, particularly at higher altitudes – with only 22 Automatic Weather Stations country-wide, most installed after 2000. This presents challenges for identifying trends in climatic variables within the two research sites as both locations lack local weather stations. In particular, no stations exist within the district of Humla – for which Shreenagar is located – with the closest station located in the neighbouring district of Jumla, some 70 km away. Given the enormous variation in topography and altitude, extrapolation of data from adjacent districts is the only method of estimating climatic variables for the district. The challenges and associated inaccuracies of doing so mean that Nepal's Department of Meteorology and Hydrology does not publish data for the district of Humla. As a result, direct analysis of observational climatic data for the two study locations is not possible.

Given the lack of climate data, some use can be taken from modelled projections. Although, few studies have been conducted for Nepal to date. A recent assessment using aggregative analysis of 15 Global Climate Model (GCM) outputs predicts a countrywide multi-model mean temperature increases of 1.4 °C and 2.8 °C by 2030 and 2060, respectively, with increases somewhat larger for the winter months than those of summer (NCVST, 2009). The projections predict an increase in the number of hot days and nights, with similar increases in the number of heavy rainfall events during the monsoon period (see Table 4). For Western Nepal the study identifies similar patterns with multi-model means of 1.4 and 2.8 °C by 2030 and 2060, respectively. Higher resolution Regional Climate Modelling (RCM) provides an indication of projected changes in climatic variables for the two study locations. For Phulbari, the models suggest an average increase in temperature of 4 °C for December–February and 3 °C for June–September periods by 2070–2090 relative to the 1970–1990 baseline under an A2 scenario. For Shreenagar the models project increases of 4 °C for both December–February and June–September periods[8] (see NCVST, 2009).

[8] Projections are from two simulations using the PRECIS and RegCM3 models run under A2 scenarios. The December–January period is representative of winter months, while June–September reflects the monsoon period. Source: NCVST (2009).

Caution must however be applied when interpreting any such projections given the lack of data, and challenges of modelling Nepal's varied topography. Indeed, GCM and RCM models do not, as yet, adequately represent the convection mechanisms or topography that influence local Nepali rainfall systems embedded within the larger South Asian monsoon system (NCVST, 2009). In short, making '*climate change projections for Nepal will be difficult and any projections must be interpreted and used cautiously*', given the limitations of GCMs, RCMs and observational datasets for this region of the world (NCVST, 2009, p. 45).

4. Methods

Qualitative analysis forms the principal means through which data is collected and interpreted within the remit of the study. Given the study's focus on the process elements of adaption, often intangible and challenging to quantify, qualitative research methods were deemed more appropriate than quantitative methods (Denzin and Lincoln, 2003). The study builds on a number of qualitative assessments and tools developed to explore vulnerability and adaptation to climate stimuli at the local level (Tschakert, 2007; Archer et al., 2008; Coulthard, 2008; Narayanasamy, 2008; Osbahr et al., 2008; Van Aalst et al., 2008; Dazé, 2009). With this in mind, the study aligns itself with growing interest in a 'second-generation' of vulnerability assessments, that give greater focus on adaptive capacity and that require a stronger involvement of stakeholders and qualitative methods (Füssel and Klein, 2006, p. 326).

The study revolves around a series of key informant interviews ($n = 18$), Participatory Rural Appraisal (PRA) focus groups sessions ($n = 185$) and semi-structured interviews ($n = 27$), with the number of selected participants totalling 230. Prior to any development into the composition, make-up, and construal of the PRA and semi-structured interview sessions, a series of key informant interviews were conducted. A total of 18 key informants were selected based on expertise, profession and knowledge regarding the topics addressed, covering a wide range of pertinent sectors: Non-Governmental Organisations (NGOs), International Non-Governmental Organisations (INGOs), academia, governmental, inter-governmental and research institutions. Snowballing techniques were used once the appropriate informants had been identified. Key-informant interviews were used to gather broad-ranging background information on various aspects of climate change, adaptive capacity, caste relations and social determinants of behaviour.

In order to explore a wider range of social characteristics and barriers to adaptation it was deemed appropriate to choose two sites, with each subject to different climatic hazards and stresses. Western Nepal was considered most appropriate given it has the strongest and most prominent cultural heritage (Adhikari, 2009). Following discussion with key-informants a highland and lowland contrast, distinguished by exposure and sensitivity to primary risk of drought and flood hazards, were deemed most relevant. Accordingly, the districts of Humla and Kailali were chosen to

best reflect contrasting cultural, topographic and climatic variables. The idea was not to compare and contrast the social barriers from the two sites. Rather, to explore and identify a wide range of social characteristics that may serve as obstacles to successful and sustainable adaptation.

Analysis at the Village District Council (VDC) level was deemed most appropriate, given logistical and village organisational structure. It also allowed for greater depth in analysing the social and environmental context at the local level. Selection of VDCs was determined by screening for sites that best reflected selection criteria, as well as ensured cooperation from village participants and relative ease of access. This was particularly the case for Humla, where no road transport exists within the district, accessible primarily through weekly helicopter rounds by the World Food Programme. With these principles in mind, and following consultation with key-informants, the VDCs of Shreenagar and Phulbari were chosen as sites most suitable for the study.

Participatory Rural Appraisal (PRA) techniques were considered most appropriate for the compilation of research data, given the need for a process of two-way generation and dissemination of collated information, a limited time frame, lack of adequate transport infrastructure, and low levels of literacy throughout the Terai and Karnali regions (Narayanasamy, 2008; Cronon et al., 2004; Adhikari, 2009). Both focus group and semi-structured interview segments of the study aimed to incorporate a series of PRA exercises ranging from: seasonal rainfall/climate calendars and vulnerability ranking exercises; to social maps, and social/institutional Venn diagrams. PRA exercises were adopted and expanded from methods of community-based participatory research for climate vulnerability and capacity analysis developed by Daze et al. (2009).[9]

Focus groups consisted of 8–10 persons, with a facilitator and a translator present for each discussion set. Even representation for each focus group session was ensured with requirements of gender, age-grouping, livelihood diversity and economic status met according to community makeup. Participants were randomly selected using the list of VDC inhabitants, accounting for availability of participation.

In light of the fact that Nepali culture denotes particular emphasis towards men, typically elders, separate focus groups and semi-structured interviews with women and younger participants were conducted. Moreover, in order to expose intricate disparities in institutional, behavioural, and cognitive dimensions, it was deemed most appropriate to isolate caste groupings for the focus group sessions. Group sessions were sought with participants of similar economic well-being, thus permitting more effective comparison amongst social classification and status rather than in relation to asset based factors.

Qualitative participatory data of this sort does have a number of limitations, and information from these tools must be interpreted with a degree of caution. For example, rainfall and seasonal calendar reconstructions can be distorted, and may vary between different groups of people (Van Aalst et al., 2008). Yet, while calendars cannot provide the same level of accuracy and confidence as meteorological and hydrological data, they can provide valuable information and insights. This is particularly the case in areas where reliable weather stations are lacking- such is the case in Western Nepal. With this in mind, the analysis does not seek to identify each social barrier to adaptation within the two study sites, nor does it strive to quantify them. Rather, it looks to expose and explore some of the most significant social barriers, and contribute to our understanding of how they present obstacles to successful and sustainable adaptation.

[9] See the Climate Variability and Change Analysis (CVCA) toolkit for further details of tools used and their applications.

5. Results and analysis

All focus group and interview sessions bring to light distinct *perceived* changes in the ambient climatic regime. Alterations in rainfall pattern, intensity and frequency are each identified in comparison to historical levels at both study sites by focus group sessions.[10] In the case of Phulbari all sessions express a discernible increase in the frequency and intensity of flooding events, as well as an amplification of the severity of impacts on inhabitants. Rainfall and seasonal calendars reveal perceived changes in the duration, timing and intensity of warm/cool periods, with participants expressing a distinct alteration in the hottest annual episode, shifting from August to July.

For Shreenagar VDC, significant perceived increases in the incidence and severity of drought are identified, with a marked fall in winter rainfall periods. Similar perceived changes in seasonality and rainfall patterns and temperature are noted. Group sessions point to marked changes in the consistency, reliability and intensity of rainfall. In particular, respondents observe that increased temperatures have resulted in restrictions/limitations in the amount of working hours for manual tasks associated with agricultural cultivation. Participants note that historically, temperature has never previously acted as a barrier, tolerating laborious activity at all times of the day.

Important to note is that seasonal calendars simply reflect perceptions in changing climatic variables, and cannot be considered empirical in documenting actual changes in climate. When analysing longer-term trends within communities, more recent events tend to overshadow more distant ones, and this needs to be taken into account when trying to extrapolate from past trends (Reid et al., 2010). However, a study by Gill (1991) compares perceived rainfall patterns recorded by Nepali farmers using rainfall calendars with the observed data recorded at a nearby weather station, and finds a remarkably good fit when comparing modal rainfall. With this in mind, the seasonal calendars used in this study can provide an insightful reference in documenting perceptions in seasonal change.

5.1. Coping and adaptive strategies employed at study sites

For Shreenagar, widely cited *ex post* strategies in copying with drought and unpredictability of rainfall comprise of wild food harvesting, reduction in food intake, trade of livestock and the search for aid assistance (both financial and nutritional) from other members of the community. While a multitude of options exist, the majority of able-bodied inhabitants rely on temporary migration for livelihood and food security in times of shock and stress.

Group discussions reveal that such practices have long since been the traditional norm. However, given persistent gradual changes in the local climatic regime, respondents express a need to migrate for longer periods in addition to seeking temporary opportunities further afield. Typically embarking for 6 months at a time, although frequently longer in times of drought, all caste groups are engaged in the activity. On average 1–2 individuals per household migrate, earning roughly 10,000 rupees.[11] Temporary migration remains exclusively male orientated, with women remaining in the VDC to continue agricultural cultivation. In general only Brahmin/Chhetri can afford to seek employment in

[10] Historical levels were taken to represent the average of 10–20 years prior in focus group discussions.

[11] Equivalent to £90 GBP *(as of 05/01/2011)*.

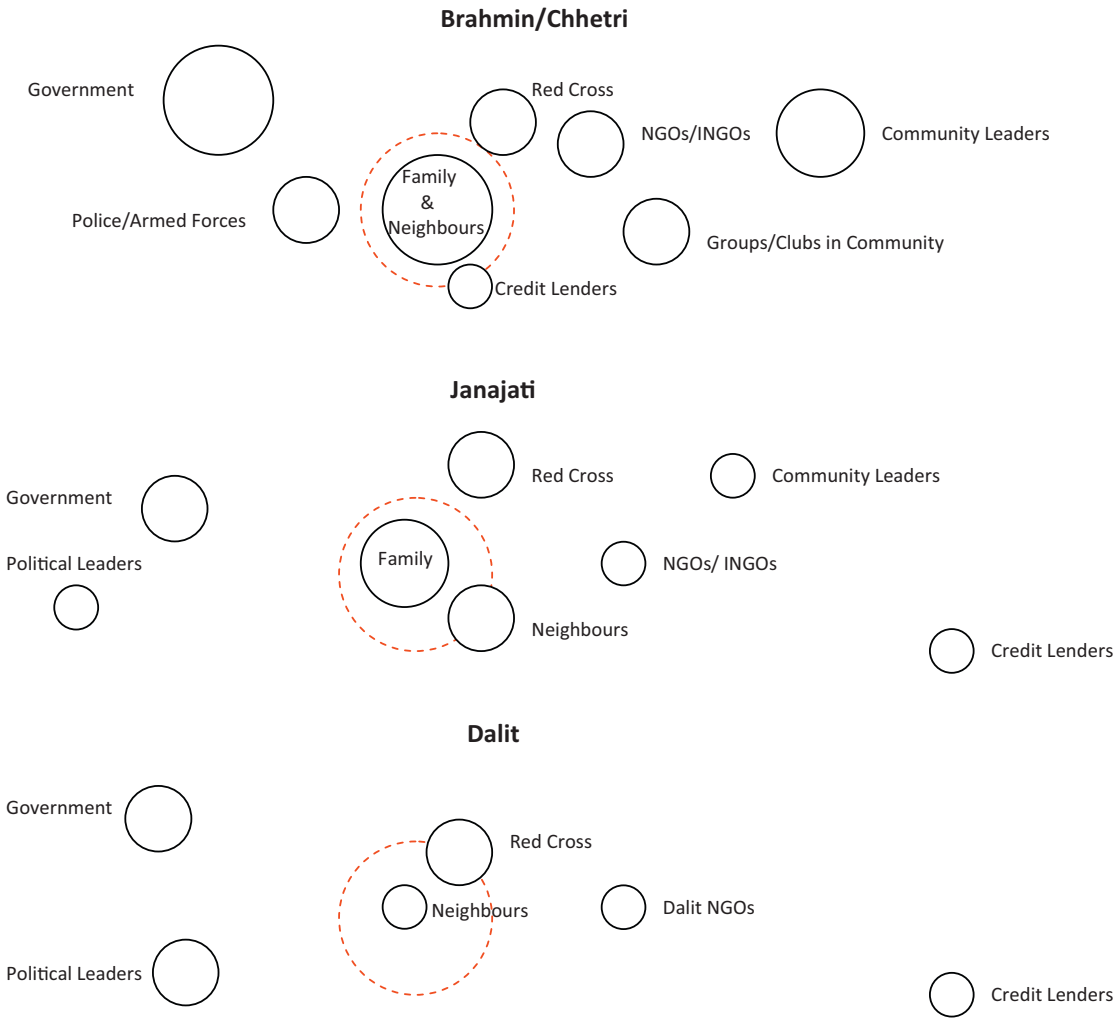

Fig. 3. PRA social/institutional venn diagram for Phulbari VDC. Red circle signifies the collective caste group. Degree of distance away from the dotted circle implies frequency level of contact during times of need – *the greater the distance, the lesser the degree of contact*. Size of corresponding circles denotes the importance of respective groups – *the larger the circle, the greater the importance*.

countries further afield.[12] Additional on-farm strategies include a delay in plantation, change in crop-varieties, and an increase in agricultural labour.

In the case of Phubari, refuge to designated 'safe areas' during the onset of flooding events is identified as a key strategy employed heavily by all caste group. *Ex ante* methods include the storage of 'food stocks', and the dissemination of early warning information throughout the adjacent community wards.[13] Observation of the PRA social/institutional Venn diagram for Phulbari highlights the dissimilarities in access and entitlement of required resources dispensed, be it in the form of government/NGO aid; assistance from political and community elite or access to education or information (see Fig. 3).

Fig. 3 suggests that, universal to all caste strata, the principal and most significant source of aid and assistance in times of need relates to family and neighbour networks. Proximate relations remain with regards to the Nepal Red Cross Society (NRCS), NGO/INGOs and government, yet these appear to be the only such direct similarities. Brahmins identify a clear affiliation with access to credit through lenders, with similar close relations to Police/Armed Guards and Community Groups, not identified by the other strata. Dalit and Brahmin/Chhetri groupings highlight a weak relationship with political leaders, with the Janajati noting the lowest such proximity. Intriguingly, both Janajati and Dalit groups render the role and significance of credit lenders as the furthest-most agent in times of need. Focus groups identify that lenders are typically comprised of upper caste members who remain reluctant to give assistance and issue loans at higher interest rates to lower caste members. Such disparities are primarily due to a lack of financial assets to guarantee repayment, in addition to marked cultural discrimination, and a tendency for Brahmin/Chhetri to support their own stratum.

A clear disparity in access to resources – financial in particular – is noted with regard to the Chhetri community in both study locations, as members are typically capable of purchasing food and other essential items to sell to the rest of the community. The study reveals the Dalit community to be heavily depended on the Chhetri collective for support during times of stress – aside from the help they derive from their own community. Similarly, a marked distancing from government and VDC officials is noted, with discussion sessions expressing a distinct lack of interest to provide assistance on the part of political leaders. Of significant importance is that despite a recognition of perceived changes in local climate amongst all caste groups, inhabitants have not directly sought to deviate from traditional coping strategies, with

[12] Many choose to migrate to the Gulf/Arab states.
[13] Early Warming Systems and community based disaster preparedness training are provided by a number of community, national and international NGOs including Mercy Corps, CARE International, and the Red Cross.

Table 5
Examples of social barriers to adaptation within the research sites.

Form of social barrier	Examples common to both locales	Illustrative examples in Shreenagar VDC	Illustrative examples in Phulbari VDC
Cognitive behaviour	- Differences in perceptions of risk and self efficacy amongst men and women - Low self-efficacy and perception of inability to effectuate change amongst Dalit groups	- Traditional hostility towards outsiders and a reluctance to accept outside aid and assistance - Misperceptions and cultural stigma towards the Humli limit employment opportunities upon migration	
Normative behaviour	- Persistence with traditional forms of coping strategies in times of shock and stress	- Vocation determined by family and caste lineage	- Janajati forced to move from designated '*safe areas*' during large flood events
Institutional structure and governance	- Dalit lack access to spaces of political power and representation at the community level - Individuals are unable to transcend caste groupings	- Dalit restricted in access and rights to natural resources	- Janajati historically unable to access land. Relocated adjacent to the river - Dalit lack equal access to financial loans and assistance from higher castes during times of need

the only change arising in the duration and frequency of coping methods.

5.2. The role of the social environment in adaptation and adaptive capacity

Within the literature review we identify three distinct, yet interrelated proponents of social barriers to adaptation: cognitive, normative and institutional. These act as a lens through which we analyse the influence of social barriers. Examples of each are evident within both research sites and described above (see Table 5).

5.2.1. Cognitive barriers

With regards to cognitive and psychological barriers respondents acknowledge that upon migration to India – the principle means of coping to climate shock and stress – Dalits typically fall victim to discrimination. Respondents note that this strategy has recently become more heavily relied upon due increasingly variable levels of rainfall, necessitated long periods of migration and increased dependency on remittance. Discriminatory perceptions of caste affect both the availability and type of temporary employment that members of the lower caste are able to acquire. In the case of Shreenagar, both focus group and interview sessions identify an outside perception of the Humli as '*thin, dirty and uneducated*', with considerable implications in finding employment as a result. This perception applies across all caste groups. Given Humla's strong cultural heritage, discussions also highlight hostility towards outsiders and a reluctance to accept any form of assistance and aid from sources outside of the region.

Similar examples of cognitive barriers are reflected by differences in risk perception between men and women, and low self-efficacy amongst the Dalit population. Regarding the latter, focus groups sessions, and PRA hazard ranking tools from both research sites identify a distinct collective perception of inability to effectuate any form of change in addressing specific needs for Dalit and women groups.

5.2.2. Normative barriers

Normative barriers are equally pertinent within both study sites. For example, in accordance with historical norms, livelihood vocation is largely directed by caste, and family name. This is particularly the case in Shreenagar VDC where certain segments of the Dalit community are bound into their family profession and discouraged from seeking alternative livelihoods. These obstacles arise not because of a lack of technical skill or capacity, but reflect traditional and historic norms restricting employment opportunities based on family lineage. Barriers to vocation and skill acquisition are not limited to the Dalit community. Indeed, while the Cheetri display a greater diversity of livelihoods and livelihood options, Chhetri respondents note a distinct susceptibility in times of food shortage due to a lack of tradable skills such as ironwork, shoemaking and tailoring – each a common asset of the Dalit occupational castes. In addition, unlike the Dalit, the socio-cultural environment, and customs associated with it, explicitly prevent even the poorest members of the Chhetri community from begging- even those in a worse financial position than the majority of the Dalit populous.

A pertinent normative barrier relates to obstacles in the adoption of new practices in response to changing shock and stresses. Focus group discussions give considerable mention to the fact that inhabitants have not sought to deviate from current coping strategies, even though distinct changes in the ambient climate are marked. Respondents note an unwillingness to deviate from traditional and historic strategies to deal with climate shock and stress. Indeed, in one instance a key informant highlights the failure of an NGO to introduce new and more efficient methods of subsistence cultivation, blamed partly on a reluctance to depart from traditional practices, coupled with a lack of willingness to accept assistance from external bodies (in part illustrative of a cognitive barrier).

A further example of normative barriers can be found in Phulbari, where vulnerability to incidences of severe flooding is not only due to the proximity to the river, but also reflect caste discrimination. As a means of responding to flood events, communities have instigated actions plans to relocate the community to designated '*safe spots*' during times of flood. However, group and interview sessions reveal that Janajati individuals are frequently forced to move to alternative places of refuge, such as the VDC's school, by members of other caste strata due to associated social stigma and discrimination; told to "*move, as you will make this place dirty*". Alternative areas of refuge are considered markedly more vulnerable and thus act to impair the Janajati's capacity respond to flood events.

5.2.3. Institutional structure and governance

Institutional barriers to adaptation are similarly noted in both research sites. Caste related political neglect by community leadership, government and NGO sources alike is observed. The hegemonic dominance of political authority, and the channels through which aid/resources are allocated by the upper caste stratum, are identified as key barriers in responding to shock and

stress. In particular Dalit and Janajati sessions identify clear cultural obstacles to spaces of political power due to social status and political discrimination. Focus group discussions point to the fact that unreceptive community leaders typically require frequent visits to request adequate and specified assistance, and are thus met with little input from the lower castes. Such incidences prove significant as upper castes dominate positions of power, frequently dictate, reserve, and allocate resources towards their own socio-cultural strata, and neglect the needs of the Dalit and Janajati communities.

In Phulabri VDC, remnants of historic caste-based discrimination are noted, as the Kamaiya system[14] presents considerable barriers for livelihood and behaviour. Group interview sessions suggest that after the system's abolishment, Kamaiya affected families found themselves lacking in vital assets and resources required to ensure adequate food security. Much of this was as a result of institutional restrictions in livelihood opportunities, and an inability to own land. Indeed, when government officials finally designated land to the Chaudhary[15] community as a whole, allocated land was given directly adjacent to the river bank, rendering the Janajati particularly vulnerable to flooding events. Reasons for which were deemed to be a result of social stigma, political neglect, lack of available land remaining, and deficiencies in financial resources. In comparison, PRA social mapping exercises reveal that residential dwellings of the Brahmin/Chhetri and Dalit communities are located at suitable distances from the river, with respondents noting significant reductions in the risk posed by flooding events as a result.

Focus groups sessions also identify restrictions to the lower castes with regards to the receipt of outside aid – both government and NGO – freedom of speech, livelihood options, political influence and employment opportunities within both study sites. In particular, access to education in Shreenagar was noted as restrictive, with preference and attention given to the students of higher caste, especially for males. With the vast majority of political space occupied by the Brahmin/Chhetri stratum, strong cultural subjugation and lack of opportunities to access political spheres serve as pertinent structural barriers. An example of which is noted in relation to the management of, and access to, forest resources for Shreenagar. With no historical right to land, and lack of financial resources, the Dalit community recently attempted to convert areas adjacent to the forest into cultivable land; a practice widely permitted to members of the Chhetri community. Although in theory owned by the community as a whole, political domination by Chhetri limits any such expansion for Dalit land conversion, serving to exacerbate current land inequities.

6. Discussion

The research findings strongly accord with recent studies highlighting the importance of societal determinants of adaptation and adaptive capacity (Hulme et al., 2007; Patt and Gwata, 2002; Adger et al., 2009a,b; Smith et al., 2010; Grothmann and Patt, 2005). Results also provide support for the principle that '*individual and social characteristics... interact with underlying values to form subjective and mutable limits to adaptation that currently hinder society's ability to act*' (Adger et al., 2009b, p. 339).

While the role of individual/collective agency cannot be downplayed, and recognising that many socially devised channels are largely informal and may be overcome in some instances, the study points to the strong influence of cognitive, normative and structural processes in influencing adaptation. Findings from both research sites point to the strong role of social characteristics in shaping adaptation actions, even after the associated risks have been identified and action is sought (see Table 4 for further illustrations). Many of these behavioural and institutional structures interact and overlap. It is here where the concept of opportunity structures is of use, as it is the opportunity structure imposed upon the Dalit, as a collective, that serves to prescribe and restrict permitted adaptation actions in both study locations.

Recognising the centrality of entitlement to power and political capital in determining levels of adaptive capacity (Gupta et al., 2010), numerous examples of how the structured nature of access to political space has helped to secure the interests of the higher caste collectives are ever-present throughout the analysis. Such features are largely ensured through hegemonic entitlement to political power and highlight numerous aspects of procedural and distributional political justice. Results suggest that institutional barriers to spaces of political power and governance can impose severe restrictions on adaptive capacity for certain fragments of the community. Determinants of political discrimination within both VDC localities strongly reflect socio-cultural features, of which gender, social status and caste grouping form principal facets.

Equally significant is the pervasive manner of '*non-decision making*'.[16] Described whereby '*societal elites have power to suppress unwanted issues, and to keep them away from the policy agenda*' (Næss et al., 2005, p. 130). Non-decision making can serve as a powerful facet of socio-political subjugation and dominance (Lukes, 1974). Focus group discussions with Dalit and women collectives from both study sites express considerable barriers to voicing their needs at the community level. Just as important, discussions suggest a widely accepted view of inability to effectuate change, present amongst women and Dalit groups. With this in mind, restrictions in access to political space may mean that the specific needs of the most vulnerable are less likely to be heard, with direct implications for adaptive capacity Brooks et al., 2005.

Regarding perceptions and thought-processes, marked disparities in attitudes towards risk, vulnerability, and adaptive capacity are noted between both men and women alike. This reinforced by widely cited perceptions of inferiority and incapacity to induce change amongst the lower castes. Perceptions, values, and ethics each play a key role in determining adaptation behaviour in terms of how action is, or is not, sought. This is further highlighted in the case of a distinct cultural reluctance amongst inhabitants of Shreenagar to accept help and assistance from outside agents, which, as noted above, contributed to the impenetrability of certain change agents to effectuate the responses necessary to adapt to changing shocks and stresses.

Relating to the role of caste, its stratified and inflexible character serves as a further barrier given the permanent nature of caste groups. Children born into Dalit households hold few opportunities to escape the restrictive opportunity structure that exists for the Dalit community as a whole – with the same applying to Janajatis and Chhetris alike. Movement between collective caste groupings is practically unattainable, those that do bear significant subjugation. Thus, while such cultural distinctions remain socially devised and enforced – with little if any physical, genetic or economic characteristics – their influence on the ability of caste groups to adapt remain profound. As such, it is not only physical and financial characteristics which can limit the individual's capacity, but a host of cognitive, normative and institutional barriers which may also serve to determine and restrict adaptation actions.

[14] A form of bonded labour associated with the Janajati in areas of Western Nepal.
[15] The Chaudaries are one of the largest Kamaiya groups.
[16] Termed by Lukes as the second dimension of power; non-decision making constitutes an exercise of power over another though the reinforcement of barriers '*to the public airing of policy conflicts*' permitting '*public consideration of only those issues innocuous to [those in possession of power]*' Lukes (1974, p. 20).

6.1. Overcoming social barriers: implications for designing planned adaptation strategies

The constraints that are posed by external frameworks and approaches are in turn reinforced by internal mechanisms and informal rules. Thus, it is possible to assume that planned adaptation activities may strengthen internal structures unless there is negotiation or willingness to engage in dialogue around how community groups are able to engage with adaptation. As long as the risks associated with climate variability and change are seen as a problem of endogenous impacts, planned adaptation may well fall short of tackling these issues. We ask, what measures exist to support adaptive capacity through mechanisms for negotiating in ways that consider cognitive, normative and institutional barriers, and imbalances within and between communities?

Planned adaptation refers to adaptation strategies that arise as a result of deliberate policy (IPCC, 2007). At the international level, planned adaptation actions are often guided by the UNFCCC international framework and the National Adaptation Plans of Action (NAPAs), and implemented by national governments, nongovernmental organisations and other civil society organisations. In 2009, following delays in developing an "*expanded*" NAPA approach, the NAPA preparation began, facilitated by the United Nations Development Programme. Steps have also been taken to develop a parallel Local Adaptation Plan of Action (LAPA) with aims of generating a decentralised and bottom-up process to adaptation planning, identifying needs specific to the local context.

In an effort to promote greater inclusion, the NAPA process incorporated mechanisms to reach ethnic minorities, women and lower castes (Ayers, 2010). Mechanisms such as "bottom-up" social-vulnerability based approaches, consultation workshops, and transect appraisal exercises were established for operationalising participation, which required experts and government officials to travel to communities across the Far-West, West and Eastern regions of Nepal to assess climate change vulnerability and to identify local adaptation options for incorporation into sectoral adaptation planning and other adaptation planning processes (Ayers, 2010).

Measures such as these are a clear indication that national adaptation planning can make efforts in incorporating many of the issues that relate to social barriers. Still, while it appears that the Nepal NAPA process was more inclusive of local needs (than for example Bangladesh) the inclusion of the most vulnerable remains a challenge as these groups are typically also those most socially excluded and therefore '*by definition the most difficult to include*' (Ayers, 2010, p. 196). Indeed, despite recognising certain institutional constraints to adaptive capacity – particularly in relation to gender-specific roles and vulnerabilities; a cross-cutting theme – little, if any, attention is given to aspects of normative or cognitive processes. This is despite their considerable influence in prescribing adaptation action at the local level across Nepal. With this in mind, it is important to maintain that while greater participation within planning processes is likely to raise the profile of strata-specific issues and concerns, their inclusiveness does not result nor guarantee meaningful and effective action in addressing them. Nor does it imply that agents are always best positioned to identify and overcome these social barriers – as may be observed in the case of maladaptive traditional norms and behaviours.

Planned adaptation can occur at multiple levels, including at the local scale. It is here that the role of wider development interventions can be significant. A number of wider development interventions, such as those aimed at addressing disaster risk reduction, social protection and sustainable livelihoods, can be crucial in addressing restrictive social environments. Development efforts that seek to reduce levels of absolute and relative poverty, to empower marginalised members of the community, and to support greater access to resources and entitlement can contribute significantly to addressing many of the cognitive, normative and institution barriers to adaptation – even if they do not operate under a 'climate change' label *per se*. Moreover, many of these wider development approaches will inevitably be affected by the same social barriers. Thus, rather than attempting to follow each approach in isolation, there is a need to recognise the complementarities in how different approaches tackle these barriers so as to move towards the common goal of helping to overcome the underlying drivers of vulnerability and social marginalisation.

6.2. Measures to support adaptive capacity within communities

The governance of adaptation is challenged to overcome ideas of constructions of reality that restrict sustainable and appropriate adaptation actions from being taken. This research has raised questions about how planned adaptation strategies may consider oppression that comes about from the informal rules of the game that dictate access to financial, social, technological, and a multitude of other vital resources. Above all, the question is how to empower people of lower socio-economic status to understand the importance of climate variability and change and the need for adaptation strategies while sitting within an rigid structure of oppressive norms?

As noted earlier, there is a growing interest in a '*second-generation*' of vulnerability assessments, which give greater attention to adaptive capacity and that require a greater involvement of stakeholders (Fussel and Klein, 2006, p. 326). While, the social barriers identified in this paper may require a wider transformation of social institutions, it is promising that the Nepal NAPA and LAPA processes provide evidence of this new generation of locally inclusive national climate action plans that pay greater attention to the particulars of the individual within communities and their vulnerabilities.

Future planning processes such as these must take into account the particular sociopolitical nuances from which to draw up plans of action from the local without reinforcing interests of some agents over others. This may require more in terms of a policy framework that enables local autonomous adaptations via community institutions (Agrawal, 2008; Ayers, 2010). Part of the challenge will therefore lie in trying to work with existing institutional support systems and traditional coping mechanisms – such as family and neighbourhood networks – rather than establishing new ones with little thought given to preexisting cognitive, normative and institutional structures.

7. Conclusion

The findings of the assessment demonstrate how the socio-cultural environment can play a significant role in prescribing routes of adaptation action as well as adaptive capacity. As the case studies show, in areas governed by strict social institutions, individuals are often presented with a defined range of options in relation to adaptation to climate stressors. Individuals can face severe ramifications – both formal and informal – for deviations from their afforded opportunity structure. Social barriers can, in many instances, play a large role in enabling or preventing successful and logical adaptation from taking place. Furthermore, the analysis contends that changes in the climatic regime may serve to reinforce the discriminatory and exclusionary nature of such opportunity structures, often, but note solely, to the detriment of those marginalised and socially excluded.

The social barriers to adaptation sit within a wider context of various natural, human and informational limits and barriers which interact and may each play a large role in shaping adaptation. The challenge will be for policy to bear on all of these, to assist the

assessment of risks and vulnerability across interconnected governance layers from local to global. Uncertainties remain as to how to facilitate adaptation financing for community-based adaptation in ways that incorporate differentiated structural adaptation barriers, risks and vulnerabilities. Planning strategies will have to consider measures to support adaptive capacity through mechanisms for negotiation in ways that are considered power imbalances within communities. And finally, deliberative processes in planned adaptation will require forms of learning that are reflexive of the social barriers to adaptation.

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