

Old Ways and New Routes:

Climate threats and adaptive possibilities in the Indian Himalayas.

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CLIMATE THREATS AND ADAPTIVE POSSIBILITIES

This chapter takes us to the Indian Himalayas where people belonging to the Gaddi Scheduled Tribe customarily practiced a dual-livelihood strategy that combines small-scale subsistence agriculture with nomadic herding of sheep and goats. In the state of Himachal Pradesh, Gaddi agro-pastoralism is a long-standing system that is adapted to an environmental niche subject to significant seasonal variation and climatic volatility. In recent decades, the exposure of Gaddi households to environmental risk – storms, flash floods, landslips and drought – has intensified as a result of climate change. As elsewhere, in the Indian Himalayas heightened environmental vulnerability is set against a wider context of market-integration and state-making processes. This chapter situates households' responses to the climate shocks in the 21st century against a historical context of colonial land settlement and resource extraction, the top-down technocratic interventions favoured by a developmental state, and the imbalanced economic relationships promoted as India has aligned itself to a neoliberal economic order. Drawing on ethnographic research conducted in Himachal Pradesh's Chamba District, we show alterations in Gaddi households' orientation to market, state and environment have heightened exposure to the impacts of climate change, while, simultaneously, allowing for possibilities to manage vulnerability either by adjusting customary practices or through diversifying into new working arrangement. Though able to demonstrate adaptive capacity, there are clear limits in the forms of agency which Gaddis can draw upon. Drawing details from two village case studies, we examine how risk spreading strategies deployed by many families drive them towards greater reliance on precarious forms of labour and unequal exchange².

With official reports and technical assessments often implicating climate change directly as a cause of agrarian distress and vulnerability³, this chapter responds to calls for climate change

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² The research on which this chapter draws was conducted by Bulgheroni and Axelby independently of one another. For Axelby's fieldwork in lower Chamba, he lived in the village here called Nichla in 2015-16 with further visits in 2017, 2018 and 2019. Bulgheroni conducted fieldwork in upper Chamba including the village here called Upala in 2015, 2017, 2018. Both Bulgheroni and Axelby drew on a broadly ethnographic toolkit including participant observation, interviews, household surveys and archival research.

³ Examples, drawn from India and with reference to Himachal Pradesh, include: INCCA (2010) and Department of Environment, Science & Technology, Government of Himachal Pradesh (2012). For an

impacts and adaptation to be conceptualised relationally with full regard to the particular unequal power structures within which subordinate groups are incorporated (Natarajan et al 2019: 902; Taylor 2015: 86). In response, we argue that Gaddis' livelihood strategies require the navigation of political and economic landscapes as much as physical ones; highlighting the need for climate adaptation to be understood in such terms. The chapter proceeds in two parts. The first part charts the historical contexts of agro-pastoral livelihood strategies in the western Himalayas. Going beyond immediate environmental hazards, we follow Orlove (2009: 160–161) in understanding climate impacts as both deriving from and contributing to existing vulnerabilities, and Ribot (2011: 1160) in recognising these vulnerabilities as fundamentally produced through adverse incorporation into systems of market production and exchange that are national and global in reach. At the same time, we acknowledge the uneven and contingent penetration of market and state relations into the vertical landscapes of the western Himalayas; and explore how resulting entanglements permit space for the agro-pastoralist Gaddi to exercise a degree of room for manoeuvre.

The second part of the chapter provides two detailed case studies that highlight the Gaddis' capacity to adjust when confronted by the adverse impacts of climate change. Adopting a grounded and localized perspective⁴, the first case study shows how, given the limited impact of affirmative action schemes, nomadic shepherds have adjusted practices and patterns of movement in response to, and in some instances, to take advantage of, climate change impacts. The second case study highlights different types of adaptive possibilities: with commercial agricultural production vulnerable to environmental threats, villagers have diversified into new forms of work that take them back to the high Himalayas. Together these case studies illustrate the means by which Gaddi families have been able to modify customary practices while, simultaneously, working to navigate their incorporation into labour and exchange regimes oriented around the needs of neoliberal capitalism. In demonstrating how environmental, economic and political forces combine to shape the transformation of livelihood strategies, we see how Gaddi people have been restrained by policies of settlement whilst also being compelled to follow new, precarious routes through landscapes subjected to the impacts of climate breakdown. As such, we argue, 'adaptation' is shown to be a relational and politically contingent process, compelling this nomadic community to engage with expanding markets in new and uncertain ways.

NAVIGATING PHYSICAL AND POLITICAL LANDSCAPES IN THE WESTERN HIMALAYAS

There is a story⁵ about a procession of gods seeking to cross the ice-bound Himalayas. Finding their way blocked by snowdrifts, Shiva, the most powerful god, produced a flock of sheep and goats which walked ahead to clear a path. Shiva then took a pinch of dirt from his skin and out of it fashioned the first Gaddi man and the first Gaddi woman and tasked them with ensuring the flock were properly cared for. Thus, the Gaddis found a home for themselves in the Himalayas, where they survived by combining small-scale agriculture with the keeping of sheep and goats. With altitude placing severe limits on the possibilities for farming,

assessment of methodological shortcoming of vulnerability assessment methodologies contributing to India's State Action Plan on Climate Change see Dhanapal and Panda (2014), and Dubash and Jogesh (2014).

⁴ Brace and Geoghegan (2011: 284); Fiske et al (2014: 10).

⁵ As recorded by Noble (1987); and Kaushal (2001)

combination of subsistence agriculture and transhumant pastoralism allowed Gaddis to take advantage of seasonal variability by migrating with flocks of sheep and goats and by shifting between winter villages and summer homes higher up. However, there are limits to flexibility of movement - economic and political transformations over the last century, combined with recent alterations in weather patterns and climatic unpredictability, pose particular challenges for Gaddi households. In this section we outline how Gaddi livelihood strategies must navigate landscapes spanning the physical, social and political, and detail how official attempts to restrict movement and settle people onto land have curtailed the space available for agency in the face of environmental and climatic change.

Gaddi pastoral movement is the largest scale transhumance of sheep and goats in the entire Himalayan region (Tucker, 1986). Shepherds travel with their flocks from low-lying winter pastures (*ban*) in Punjab, up through home villages in the Kangra and Chamba Valleys to spend the summer sheltering from the monsoon rains at high-pastures (*dhar*) in the upper parts of the Chamba or in Lahaul to the north.

“Snow and frost in the high ranges, and heavy rain and heat in the low, make it impossible to carry on sheep-farming on a tolerably large scale with success in any one part of the country. The only way is to change ground with the seasons, spending the winter in the forests in the low hills, retreating in the spring before the heat up the sides of the snowy range, and crossing and getting behind it to avoid the heavy rains in the summer” (Lyall, 1874: 46).

Alternating through this series of seasonally limited niches, transhumant nomadism allowed Gaddi shepherds to exploit grazing resources across a series of altitude zones subject to significant climatic variation (Bhasin, 1988).

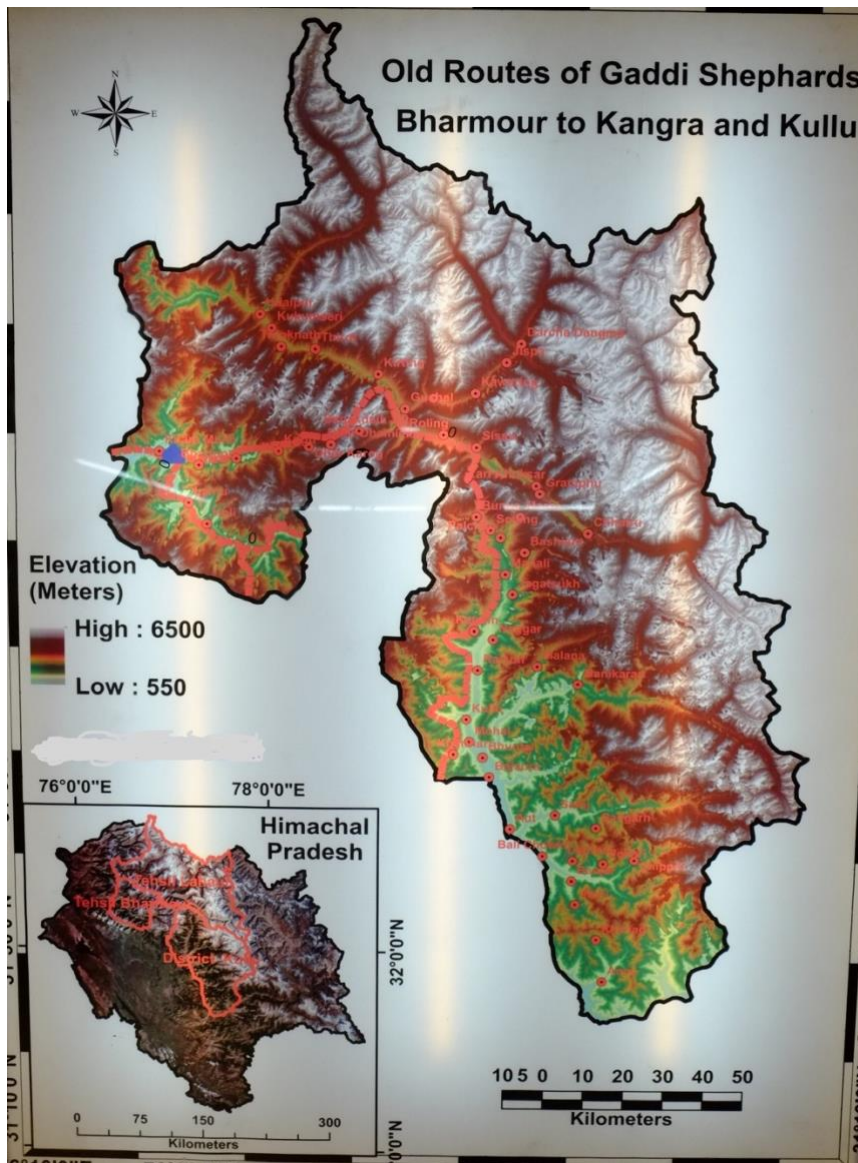


Figure 1: Routes of Gaddi shepherds in Chamba, Kangra and Kullu Bharmour; image taken by Axelby (1/4/2016) from Forest and Tribal Culture Awareness Centre, Bharmour, Chamba District, H.P.

The migratory cycle of Gaddi flocks is oriented around villages in the Chamba and Kangra Valley. From each flock-owning family, one or two men migrate with the flock while other household members stay year-round at 'home' where, customarily, they tend to the fields. Land holdings were and are generally small, altitude limits the possibilities for farming and winter crops are imperilled by the possibility of late snow. Farming is still based on rainfed-irrigation and thus is dependent on the timing and quality of summer and winter monsoons.

In this marginal and climatically variable region, few households are able to meet subsistence requirements from their farming or shepherding alone. To view Gaddis either as being primarily shepherds or primarily farmers obscures the interdependence of these activities. With summer and winter crops sufficient to cover basic food requirements, the keeping of animals provides wool, meat and, when sold, a source of cash. Maintaining a flock traditionally provided a vital safety net in an uncertain and marginal environment where crops could fail with a poor monsoon and animals might be lost to storms, landslips, bear or leopard

attacks, or disease. The combination of shepherding and agriculture diversified livelihood options as a means of spreading risk.

Looking beyond the determining influences of the mountain environment of the western Himalayas, Gaddis' nomadic movement exists within a shifting web of relationships – with settled farmers and landowners, with buyers of meat and wool, and with the state in the form of forest guards and revenue collectors. Based on the exploitation of a series of narrow climatic, geographic, economic, political and social niches, Gaddi agro-pastoralist livelihood strategies are sensitive to change in any one of these areas. A historical review of changes introduced under colonial rule, in the post-independence period, and the neoliberal India of the 21st century, demonstrates a radical reconfiguration of the relationship between land, people, market and state. Colonial attempts to impose order on the 'unruly' landscapes of the western Himalayas saw the systematic mapping, measurement and demarcation of forest and cultivable land across the region (Bhattacharya, 2019; Chhatre, 2000: 4). Settled tenurial regimes of private and state property were at odds with customary collective arrangements that permitted temporal and spatial flexibility: 'the shepherds' scope to react to climatic and environmental change, to adjust temporally and spatially, was severely constrained' (Kaul, 1996: 107).

With tenure established in ways that enabled the state to levy taxes on landowners, official policy encouraged the expansion of commercial agriculture, including, following Independence, efforts to promote horticulture and cash crops in Chamba District. Finding their nomadic movement restricted, and poorly placed to benefit from intensified agricultural production, Gaddi households were severely disadvantaged in the new agrarian order of post-independence Himachal Pradesh. In an attempt to compensate for the loss of access to natural resources, state-promoted developmental efforts were established to provide educational and occupational opportunities, deliver subsidized food programs, and extend road connections to remote and 'backwards' tribal areas (Axelby, 2017). If land could be developed, then so too would be people. In 1950, on account of their unique culture, their geographical isolation and the 'backwardness' of their traditional nomadic occupation, the Gaddis of Chamba district were granted Scheduled Tribe status (Lokur & Pande 1965) Recognising that 'the weaker sections of the people' were deserving of assistance, the official category of Scheduled Tribe (ST) is part of a nation-wide system of affirmative action which sought to improve the social, educational and economic position of tribal communities and integrate them into a notional mainstream. The upper part of the Chamba Valley – the Gaddi homeland known as Gaddern – was designated a tribal subdistrict with enhanced budgets for education and infrastructure provision. Even so, members of Scheduled Tribes in Chamba District were over-represented among those living below the poverty line and among the poorest of the poor. Here, the agro-pastoral Gaddi have long suffered from disproportionately low incomes per capita and perform poorly on multidimensional human development indicators, including child mortality and literacy (Axelby 2017).

Here we have described the extension into the Western Himalayas of a developmental state that sought to promote land settlement, scientific forestry, enclosure of wastes, agricultural commercialisation, intensification of resource use, land redistribution, mechanisation of farming, education, the building of roads and bridges, and the extension of chemical fertilizers and new HYV seeds. Across a century of colonial rule, both the central-planning era of the post-independence decades and, more recently, the large-scale withdrawal of state interventions in favour of neoliberal market-driven approaches, policies have been driven by

shared calculations about the control of territory, the extraction of natural resources and the exploitation of labour (Taylor 2015: 5; Moore, 2010). Collectively, the changes outlined in this section – the settlement of land and scheduling of people – brought about a radical reconfiguration of the relationships that Gaddis living in the Chamba Valley have with the environment. Against this historical background, the impacts of climatic change in this ecologically sensitive and climatically variable region have further complicated the matrices of risk and vulnerability to which Gaddi households are subject.

The Himalayas are recognized as a region where the ongoing climate emergency is having disproportionate impacts (INCCA, 2010). In comparison to average global air temperature increases of 0.5°C–1.1°C over the last century, the North Western Himalayan region has warmed by as much as 1.6°C (Bhutiyani et al. 2008). In an analysis of long-term changes in surface temperature in Indian states from 1951 to 2010, Rathore et al (2013) report that the highest increase in annual mean maximum temperatures was observed over Himachal Pradesh (+0.06°C /year). The effects of climate change are visibly apparent in the melting of icefields and glaciers⁶. Snow falls have decreased, both in quantity and duration (Bhan and Singh 2011). Concerning rains in the Indian Himalaya region, studies report that the total quantity has been reduced over the last century (Prasad and Sharma 2016) but that monthly rainfall shows a mixture of rising and falling trends. More studies agree that, in recent decades, Himachal Pradesh has experienced increasing trends in pre-monsoon and winter rains, together with a decreasing of annual monsoon and post monsoon seasons (Jaswal et al 2015; Bhutiyani et al. 2010; Rathore et al., 2013).

Surveys conducted in our two study villages reflected how the meteorological data is being experienced on the ground. In Upala village at the heart of Gaddern, villagers observe that snowfall has decreased in quantity especially but also in timing. While only thirty years ago, the village was under four or five feet of snow for up to half the year, now the snowbound months have shortened to one or two each year and falls rarely exceed two or three feet. The dense fog of the monsoon has become a rarity – these months are now characterized by heavy rainstorms interspersed by days of drizzle. Outside of the monsoon, it is reported that rainfall is heavier during the winter, and pre- and post-monsoon months. The sense of an increase in climatic irregularities, during and among seasons, is repeated in reports from lower Chamba's Nichla village; our second study village. Here villagers have experienced an increase in snowfall in winter months and unseasonal storms throughout the year. At the same time the monsoon rains are observed to have become markedly less reliable in timing and extent. As temperature and precipitation rise, so too do the intensity and irregularity of climate events. Flash floods wipe out terraced fields; unseasonal droughts reduce the water upon which flocks and crops depend. While acknowledging that it is difficult to attribute particular weather events to anthropogenic climate change, it is undeniable that human and natural systems in Himachal Pradesh are undergoing unprecedented alterations. Communities who depend most heavily on natural resources for subsistence livelihoods are likely to be the first and most affected by climate change. With their customary reliance on

⁶ A study of the Manimahesh Glacier calculates that between 1971 and 2013 it retreated by 157 ± 34 m (4 ± 1 m year⁻¹) and estimated that the total area lost is at 0.21 ± 0.01 km² (0.005 km² year⁻¹) https://www.researchgate.net/publication/282897662_Frontal_changes_in_the_Manimahesh_and_Tal_Glaciers_in_the_Ravi_basin_Himachal_Pradesh_northwestern_Himalaya_India_between_1971_and_2013 (accessed 8th June 2020).

rainfed agriculture and transhumant pastoralism, Gaddis in Himachal Pradesh have been left uniquely exposed (Aryal et al, 2014).

‘Climate change is an expression of deeper and often harder to grasp socioecological relationships’ (Pelling, 2011: 176). This section has reviewed the deeper historical processes and structural inequalities against which contemporary climate change vulnerabilities in the western Himalayas have been produced. Following Orlove (2009: 160–161) in understanding climate impacts as deriving from and contributing to existing vulnerabilities, we recognise how impacts and the possibilities for adaptation are reproduced within overlapping structures of power that operate at different spatial scales (Taylor, 2015; Ribot, 2011: 1160). Operating from a position of economic and political marginality, Gaddi households have simultaneously been subjected to official pressure to adopt a sedentary lifestyle, while at the same time being pulled by economic compulsion towards deeper integration into global markets. In the next section we offer case studies of two different villages – one in the upper part of the Chamba Valley near Bharmour and one at a lower altitude close to the district headquarters at Chamba Town. In doing so we adopt a broadly ethnographic methodology that highlights the practices, experiences and perspectives of people as they are subjected to change and as they respond to reduce their vulnerability (Fiske et al 2014: 10). This approach allows us to recognise the uneven and contingent nature of market and state penetration into the western Himalayas and the emergence of new spaces in which Gaddi people may deploy literal and metaphorical room for manoeuvre.

IMPACTS, RESILIENCE AND ADAPTIVE POSSIBILITIES

Rather than present a simplistic binary divide between local people dependent on access to natural resources and powerful, monolithic forces of state and market, this chapter takes seriously climatic and environmental factors as independent variables playing an active role in shaping livelihood possibilities in the western Himalayas. Having outlined the radical reconfiguration of both the physical setting and the socio-political structures that frame the conditions in which people live, we now consider the capacity of Gaddi household to respond. In these case studies we see how adaptation extends beyond responses to alterations in natural environment such as air temperature or water supply, to consider the operation and constraints of rural labour markets, educational provision, agricultural economics, and government policies including land reform, agricultural extension efforts, infrastructure promotion, welfare provision including subsidised food programmes, and reservation of jobs. Adaptation is therefore shown to be rooted in relational dynamics which both prevent and enable forms of adaptive agency, and politically contingent, as Gaddi community members navigate their integration into regional markets, and the (re)shaping of their livelihoods through state policies.

Case study 1: Upala Village in Upper Chamba (altitude 2300 meters)

In a narrow tributary valley of the Budhil river, Upala is a nucleus of about 60 houses lying at 2300 meters above sea level among patches of pine trees. Villagers narrate that Upala was settled by families who arrived in Gaddern in the 17th century. Under the rule of the Chamba Rajas, land could be turned for farming with the permission of the state. Seeking good land at different altitudes, over the centuries, repeated generations of Gaddis expanded

cultivation across the hill sides around Upala by digging, sometimes in places quite far from their family home, small terraced fields sustained by stone walls.

The upper part of the Chamba Valley – the Gaddi homeland known as Gaddern – is designated a tribal subdistrict entitled to enhanced budgets for education and infrastructure provision. In 2005 a new road connected Upala village to Bharmour town. Increased connectivity has brought a host of social, political, economic changes and, as villagers opine; climatic ones. And since the road's construction has been concomitant with improved investment in youth education, it has arguably also exacerbated the disillusionment of younger Gaddi generations in a context where occupational opportunities outside the village are scarce. Between heightened expectations, persistent unemployment, and the expansion of transport infrastructure, families living in Upala are suspended in a politics of waiting for a promised future, and the possibility of adapting pastoralism and subsistence agriculture to current pressures.

Without exception, families in Upala practice agriculture – typical landholdings range from 50m² to 200m². Given the severity of winters, all but a few of Upala's villagers would, until as recently as a decade back, leave the village for lower altitude homes elsewhere in the Chamba Valley or to the south in Kangra or Punjab. By contrast, today villagers express the view that the warming climate, coupled with the road construction, has actually reduced the village's isolation - many families now remain in Upala throughout the year. Barley is grown in winter; maize and beans during summer. Over the last decade, land has been turned over to the production of apples and beans which are exported to cities in Himachal Pradesh and further afield. And yet, overall, the shift towards commercial agriculture remains partial. Now, as in the past, production is mostly destined for domestic consumption; despite the availability of subsidized hybrid seeds and food grains, families continue to sow *desi* (local) crops which they say taste better than imported varieties.

Agriculture retains its role, but it is generally agreed that farming is undertaken with less enthusiasm than in the past. While two decades ago all land in the vicinity of Upala was cultivated, today on average a quarter of families' fields are left empty. The dispersal of fields over a wide area, their small size, the increase in formal education and the provision of subsidized grain rations are cited as factors behind this decline. In this context, farmers report rising instances of crop failure that are directly attributable to climate events. This is especially true for the summer crop which is impacted by prolonged dry spells favouring pest invasion, and by the increased frequency and intensity of violent storms. On the other hand, warmer temperatures favour the growth of foreign vegetable varieties, and villagers have maintained flexibility through dynamic diversification into secondary crops.

Demographic change, rising costs and low returns from agriculture have left families in Upala keen to diversify into other areas. A dozen has established small businesses, mainly in transport or commerce; other individuals have found employment in shops and hotels in Bharmour. But while connectivity has improved, this has not necessarily translated into their being able to take advantage of new occupational opportunities made available from education and the expanding economy. The Tribal Sub-District is well provisioned with schools, and as members of the Gaddi Scheduled Tribe, young people in Upala are able to take advantage of educational assistance and reservation quotas in schools and colleges. However, this has not necessarily translated into access to the 'high jobs' with public or private employers that many young people dream of. As elsewhere in India, the number of government jobs that were once available to Gaddi ST candidates under the reservations

policy is inadequate when compared to the scale of the unemployment problem amongst the SC and ST populations (Corbridge and Harriss, 2013). Only a few individuals – often using political connections – successfully obtain prestige employment and they typically move out of Chamba along with their families. For those that remain, manual labour in the village is sporadically available: building houses or undertaking public works through the MGNREGA scheme.⁷ The promise of education and high jobs has persuaded many households in Upala to abandon their customary nomadic pastoralism - today only fourteen out of sixty households are actively engaged in nomadic pastoralism, a pattern that is repeated in neighbouring villages. Yet, in the absence of alternatives, the keeping of sheep and goats remains surprisingly persistent.

In August 2017, Bulgheroni joined a herder from Upala village who had spent two months at summer grazing pastures in Lahaul. The young man was travelling back to Upala with two other herders from Bharmour and their flock of six hundred sheep and goats. With temperatures in Lahaul dropping, and monsoon rains in retreat, the herders were returning to their village homes as part of the great downward migration to winter pastures in Punjab. The route from the summer grazing meadows in Lahaul to the village commons in Bharmour initially follows the river course, continues up the valley to reach the glacier, then climbs steeply to the Upala pass – a narrow passage between huge rocks. The rocky moraine surrounding the glacier is a visible sign of its retreat and is particularly apparent on the northern Lahauli side of the pass. The journey is punctuated by possible stopping points (*goth*) where herders can stay for the night. The decision of where and when to stop depends on the position of the sun, the meteorological conditions, and on the other groups of herders walking in front or behind. When drizzle set in on the second day of the journey, the group had to stop at the lowest *goth* - a big rock under which it is possible to start a fire. The plan had been to reach the final *goth* below the glacier, and to be in a position to cross the pass the following morning. But with the rain making the path slippery and dangerous, it was preferable to wait. A second group of herders reached the camping place and announced that they had received a phone call from a relative in Bharmour forecasting rain. Shepherds know that when it rains in Bharmour, it snows on the pass. A delay was necessary. The following day, the shepherds left late when the sun was already high, walked only for a few hours, and crossed the river on an ice bridge before finally reaching the upper part of the moraine where the flock halted for the night.

The next morning, before the first rays of light had touched the tips of the peaks, the flock were already walking on the glacier. Herders carried several litres of water and a dozen chapati for the Goddess, whose territory they were entering and who had the final word on the outcome of their crossings. Other herds followed; delayed by the previous day's rain well over a thousand animals were now jammed under the steepest part of the glacier. Here a path on the snow needed to be carved with axes to allow animals through. But the number of animals crossing simultaneously muddied the ice which melted as the sun rose. Two goats fell from the path, but managed to climb up again, scared by the fall and by the loud encouragements of the shepherds. If the flocks had reached the pass when it was snowing, they risked becoming trapped. Going down on Bharmour side, several dead animals were conserved in the ice - reminders of less lucky crossings.

⁷ A state programme established in 2005 which guarantees every rural household the right to 100 days of employment each year.

Altered environmental and economic contexts have heightened conflicts over access to grazing and water across the western Himalayas. In the low-lying areas close to the Punjab border, urban extension, the intensification of agriculture, alterations in cropping patterns and environmental degradation have reduced grazing space and vegetation quality. Additionally, shepherds have to content with animal theft, aggressions from drivers on the road and mushrooming construction around towns. Shepherds report that rising temperatures have affected the quality of grassland and, consequently, animals' health. Dry monsoons and unseasonal storms have left soils drier or covered in mud; a warmer climate favours the expansion of noxious plants and pushes their growth toward higher altitudes. As the account of the journey over the Upala Pass shows, risks are heightened during migration between summer and winter pastures, owing to the melting of glaciers and storms leading to landslides and rockfalls, off-season rains and strong winds in Lahaul. These events and processes test herders' capacity for improvisation. In response to these changes, shepherds have increased the percentage of goats in their herd since, compared to sheep, they can better avoid noxious plants. In addition, evidence shows a doubling of variations in small movements among winter grazing lands compared to two decades ago - an effective strategy to compensate for scant availability of vegetation. Without exception herders report that, whereas twenty years ago they could graze in the same land for about two weeks, today they must shift to the next land after five or six days. Recognising climate change as manifesting in complex and contradictory ways that vary within and across locations, shepherds report impacts at higher altitudes as being less severe and, to some extent, as advantageous. Overall reduction in snowfall has increased the duration during which alpine meadows are available for grazing. Taking advantage of the shortening of snowy months, herders now anticipate an earlier arrival and up to an extra month spent at the luxuriant high pastures of Gaddern and Lahaul. Both at winter and summer grazing lands, and when moving between them, Gaddi shepherds have proven able to adjust spatially and temporally to changes in grazing resource availability. This might explain *how* migratory pastoralism continues but we need to look at its integration into the market economy to understand *why*.

Despite compound difficulties, mobile pastoralism in Upala village and in Gaddern as a whole has proven to be surprisingly tenacious. Why would this be? Whereas until the end of the 1970s, animals and wool were mainly exchanged with other products or services, transport connections to urban consumers mean that today animals are sold in large quantities to butchers in Bharmour as well as to traders from Delhi, Punjab and Jammu & Kashmir. Urbanisation and changing consumption habits have therefore assured the continuity of this customary activity. Though the environmental niches in which pastoralism operates are undergoing dramatic alterations, including a heightening of risks and difficulty, changes in economic calculus have persuaded many families to maintain small flocks of sheep and goats which are sent away to migrate seasonally between summer and winter pastures. Embracing capitalist logics, the keeping of sheep and goats has transformed into an investment opportunity. The opening of opportunities to sell meat to an expanding urban market has brought changes in the way in which grazing resources are accessed and the employment of labour to travel with the flock (Axelby, 2007; Axelby 2016). Though a smaller proportion of families in Gaddern have members that travel with the flock, the profitability of shepherding has encouraged households to place their animals under the care of professional shepherds who are paid in cash or kind to maintain the migratory cycle - in effect ownership and workforce have separated. Though shepherding is not considered an attractive occupation, for some - young men waiting for better opportunities to arrive, or as a lifelong occupation

for those lacking educational qualifications - it remains profitable and hence is preferable to other kinds of uncertain, temporary and precarious work available elsewhere.

Leaving Upala we turn now to a second village, lower in altitude and closer to the District Capital but more exposed to the uncertainties of agricultural and labour markets.

Case study 2: Nichla Village in Lower Chamba (altitude 1100 meters)

In the lower part of the Chamba valley, the village of Nichla is a tight cluster of eleven households set amidst terraced fields under a hill-side thick with oak and deodar. Below the fields there is an abrupt drop to the river and to the road. At 1200 meters above sea level, the land produces two crops each year - the staples are maize, which is harvested in late September, and wheat, which grows through the winter months and is harvested in April. On first sight Nichla village gives the appearance of timeless simplicity: family farms and terraced fields supported by rain-fed irrigation. However, on closer examination a more complete picture emerges: this village is newer than it initially appears, and the Gaddi families living there are subjected to forces – economic, political and climatic - that reach beyond the local and national to become global in extent. Having used the example of Upala to examine impacts of climate change on shepherding and demonstrate the capacity to respond, Nichla village illustrates the adaptive possibilities for agriculture in the face of risk, and a shift into seasonal labour in an attempt to compensate for the loss of migratory flocks.

The second half of the 19th century saw a wave of out-migration from the Gaddi heartland around Bharmour. Some – including the ancestors of the families living in Nichla - moved to the low hills above the Raja's capital (Noble, 1987). Continuing to combine nomadic shepherding and agriculture, these pioneers were able to establish themselves in the area by agreeing to hand over half their crops as rent to members of the Raja's court and wealthy business families. Though this change of residence opened up a new niche for pastoralism – shepherds in the lower villages could shift their flocks up to their upper village homes each summer – the ability to produce two crops from the land near the river allowed the Gaddi families living in and around Nichla to begin the transition away from nomadic pastoralism. Sedentarization was the stated aim of over a century of Government policy: marginal tribal people living in remote locations and following nomadic occupations should be integrated into the mainstream of economic and political life. The sedentarization process was further accelerated when the HP Tenancy and Land Reform Act of 1972 forced owners to hand over their land to the families who farmed it (Bhatnagar, 1981). By the late 1990s all of the families in Nichla had made the decision to abandon mobile pastoralism, though, it should be noted, most continued to keep a number of animals that could be grazed locally.

In the post-independence decades villagers benefitted from the provision of food rations through the public distribution system in the 1970s, the delivery of piped water in the '80s, and the arrival of electricity in the 1990s. But the most significant change was the widening of new income sources. While previously agriculture had been carried out primarily for subsistence, the metalling of roads and improved communication links now allowed for the transportation of produce for sale at market. The shift towards commercial agriculture was further promoted by the distribution of government subsidised rice which replaced maize as the dietary staple. A variety of vegetables – including tomatoes, cabbage, cauliflower – are now grown in Nichla. However, the move towards commercial production exposed

households to market volatility at the same time as climatic variation brought new unpredictability and threats to crop yields⁸.

A sensitivity to environmental change is clearly evident in Nichla especially with regard to the heightening of risk caused by of climate change and discussions about how best to minimise impacts. Observed parameters of environmental change in lower Chamba include the loss of various tree species, the drying of long-established water sources, increases in pest populations, and changes in bird types and populations. More concerning to the farmers of Nichla is the increased vulnerability of crops due to drought, landslides and the increased incidence and intensity of rainstorms which are directly attributed to climate change. “When we need rain there is not enough, and when we don’t need it there is too much” is a common refrain which summarises the difficulties faced by farming-families dependent on rain-fed irrigation. Wise hands tell you that the first day in any crop’s life is the most important day, but uncertainty makes it difficult to judge the optimal time to sow. If sufficient rain doesn’t arrive in June the maize crop doesn’t grow, later in the season it is particularly vulnerable to damage from wind and rain. In September 2018 a particularly violent storm tore through this part of the Chamba valley and wiped out almost the entire harvest in a matter of minutes. Winter rain and snowfall are observed to have become more frequent – the ground becomes saturated leading to landslides that take fields and houses with them. Damage to crops and settlements result in severe economic loss for farming households.

In Nichla, as in Upala, diversification into new varieties is a response to the heightening of risk. Additionally, farmers adjust sowing times in response to meteorological events and make decisions on how much to sow according to their perception of meteorological conditions. Farmers increasingly rely on the purchase of pesticides and herbicides to ensure a successful harvest. But little can be done in the case of storms and landslides, and flexibility in crop diversification also has limits. Land-poor Gaddi households are constrained in their ability to move away from maize production – maize is not just a cash crop but also provides stalks to feed draft animals and husks that are burnt for heat in the cold winter months. Having abandoned mobile pastoralism in favour of settled farming, the families of Nichla find themselves exposed to increasingly uncertain weather conditions.

Compared to the wealthier non-tribal households⁹ in the area around Nichla, Gaddi families’ dependence on rainfed agriculture and the production of maize and wheat means they bear a disproportion degree of vulnerability to climatic and market uncertainty. In response to the heightened risks posed by climate change and agricultural market variability, the families of Nichla are continually having to diversify their activities and spread risk by pursuing a range of options that include agricultural and non-agricultural labour. In lower Chamba, Gaddis are a minority and – even more than those living in the tribal subdistrict – they lack the social, political and economic assets need to gain employment in good government jobs. As a result, they are pushed towards combinations of income-earning activities which, being temporary and precarious, they label ‘petty work’. These forms of work extend from rural to urban settings with migration outside of Chamba and Himachal Pradesh for varying periods of time.

⁸ see Axelby 2018 for a fuller account of the development of Gaddi villages in lower Chamba in the post-independence period.

⁹ ‘Caste’ Hindu families occupy better quality land and have greater coping capacity due to their ability to maintain irrigation through piped water, the provision of government backed insurance schemes, their lower degree of economic dependence on agricultural production and their ability to access other income earning opportunities.

Many Gaddis now must leave their village homes and travel seasonally in search of work building roads or labouring on hydro projects. Moving beyond nomadism, these new forms of migration have become an increasingly important – though temporary, precarious and irregular – component of household livelihood strategies that combine agriculture and livestock rearing with local and non-local wage labour. ‘Project work’ is generally obtained through labour contractors who recruit for work on hydropower projects and road building programmes elsewhere in Himachal Pradesh. The daily wage rates may be high – up to three times the state minimum wage / MGNREGA rate - but the work can be difficult and dangerous and the living conditions rough. Those labourers who leave Chamba to work on projects often live in very basic accommodation - parachute tents or stone huts - especially when making roads in remote mountainous areas. These new forms of seasonal migration clash with the agricultural calendar – workers are drawn away in April-May and September-October when the demand for labour in the village is most acute.

There is, in fact, a long history of labour migration into the Himalayas for road construction. The border roads were constructed by a seasonal migrant labour force drawn from Jharkhand, Bihar and other states. But for the Gaddi families of lower Chamba the need to migrate in search of work is a relatively recent phenomenon. In September 2014 Axelby visited a temporary camp below the remote Sach pass where several men from Nichla village were employed to repair the mountain road. It took six hours and three buses to arrive at Bhairagarh – the final village on the Sach pass road over the Pir Pangal range. Walking a further ten kilometres brought us to Kalaban where a tractor at the side of the road marked the site of the road-builders’ camp. Behind the tractor a blue tarpaulin covered a store of picks, crowbars and heavy hammers. Just below the road we found a stone-walled hut, with space to sleep ten people. The roof was made of timber planks and a yellow tarpaulin held down by large stones. To one side a kitchen space had been established from another tarpaulin roof and a couple of aluminium sheets as a windbreak. Aside from a single Nepali labourer all were from Nichla or surrounding villages in the lower Chamba valley.

After the sun dropped behind the ridge it became very cold very quickly. The workers huddled around the campfire to eat dal and rice, then slept under blankets in the door-less hut. The next morning, as the sun flooded the valley, they ate parathas and drank more black tea. After some time, they walked back to the buttress they were tasked with constructing. One worker took a lump hammer to a large boulder while another used a metal pole to pry it open. They explained that they were building a buttress to stabilise a section where the hillside is particularly steep. Though the work was hard, all agreed that that pay was more than adequate compensation for being away from home. The Gaddi men at Kalaban joked that this new line of work duplicated the nomadic traditions of their grandfathers: leaving home to live for months at a time at remote mountain passes where the work was hard and physical but not without reward.

As described by Urry (2016: 21), from the final years of the last century, neoliberalism ratcheted up global processes of movement – the transport of goods and people - enabled by oil. The example of Nichla – the promotion of cash crop production for markets, intensification of land use, and the search for wage labour – shows how global processes affect local contexts. Thrown into this context, climate change impacts have heightened the calculus of risk and reward for households already precariously reliant on combinations of small-scale agriculture and local wage labour. There is no road to Nichla village, and none of the inhabitants owns a car, but working to make roads, these grandsons of shepherds are

now tightly bound up in a high-carbon socio-economy that drives climate change. Their strategies to adapt to the changing climate are entangled within the new economic and political realities that have reshaped their lives, rendering their integration into markets a politically contingent choice and constraint.

Climate change alone cannot explain the balancing of risk that led the Upala shepherds to drive their flocks over the high passes. And the workers from Nichla were drawn to Kalaban in part by demographic change, their position at the bottom of the social hierarchy and their economic marginality. But as the cases of Nichla and Upala demonstrate, understanding of adaptive responses in the face of the ruptures caused by a changing climate are best advanced with proper consideration of the ways in which control over land and labour, and engagements with state and market, are historically shaped and hierarchically ordered.

CONCLUSION: RUNNING THE GAUNTLET

A British settlement officer who surveyed the Western Himalayas in the 1860s described the obstacles facing Gaddi shepherds when moving between their winter *bans* and summer *dhars*:

‘I have heard old shepherds say... it was like running the gauntlet to convey a flock across the low country to its ban. Every petty official or influential landowner tried to extort something as the flock passed him. A mild man was easily daunted and had no chance so the Gaddis picked out their ugliest customers for the work’ (Lyall, 1874: 48).

Like the story of the divinely created flock that opened a path through the snow, this account speaks to the Gaddis’ long-standing ability to find a way through political obstacles and challenges, their capacity for adaptation, and their ability to scratch out a precarious living in a remote and hazardous landscape.

In this chapter we have brought these stories up to date - looking at how Gaddi households in different locations have, in different ways, reacted to changes in economic and political context in combination with recent changes in climatic conditions. Attempts to bind Gaddis to a wider political economy - through education and reservation of Government jobs – have, at best, benefited only a privileged few. Despite the provision of roads, welfare measures, and subsidised food programmes; remoteness and marginality continue to define Gaddi lives. And contrary to development doctrines that emphasise settlement and market and political integration, it is in such spaces that the possibilities for alternative adaptation are located.

Climate change produces ruptures and increases risk for livelihoods that are already precarious and peripheral. Our review of adaptive possibilities illustrates how Gaddis households have sought room for manoeuvre, first, by adjusting existing agricultural and pastoral production in response to uncertainty and, second, in seeking to spread risk by diversifying into new forms of work. In both instances, by conceptualising power as relational, we see how the experience of climate change is mediated through broader structures that promote extraction of produce and the exploitation of labour. Adjustment is possible in the sense of reducing vulnerability to climate change, but it comes at the cost of integration into commercial and labour relations on terms that are highly unequal. Recognition of the wider political and economic context demonstrates the limits of adaptation and the ways in which power relations shapes agency and economic mobility to its interests. Now, as in the past, Gaddi households seek to maintain an existence that combines the mobile with the settled

and which incorporates shifting formulations of individual and collective endeavour across different landscape both close to home and far away. Now, as in the past, they are only able to do so by taking paths that reinforce their marginality and precarity and that leave them exposed to further changes in the physical and political environment.

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