

# Social and economic characteristics of Ladakh, India.



**Katharine Sherratt**  
*Geology for Global Development*



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## Executive Summary

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Ladakh has a population density of three people per square kilometer. It has been described as a “constellation of villages” within the “crossroads of Asia” (Pellicciardi 2010). Despite extreme topography, and a highly variable cold desert climate, agriculturalists have strategically managed the environment for perhaps 8,800 years (Miehe et al 2009), but the risks are changing as a result of recent and rapid climatic and socio-economic shifts. It is possible to adapt to risk, if the context is understood and the risks are well communicated.

Since India’s partitioning, there have been continuing border disputes from both Pakistan (since the 1940s) and China (since the 1960s). Ladakh itself, under the state of Jammu & Kashmir, is divided between the Buddhist majority Leh district, and the Islamic Kargil district.

Historically, subsistence agriculture has been a major component of both society and the economy. Pastoralists trade dairy, wool, and pashmina goat fibre. Arable farming, of barley and wheat, is tightly constrained to the summer months, between May and September (LAHDC 2011).

The economy in Leh is expanding. Integration into India, and demand from an Army base, resulted in a rapid investment in physical infrastructure. Opening to tourism in 1974 created thousands of jobs, and now contributes up to 50% of the region’s GDP (Pellicciardi 2010). The district population has increased by 44% in twenty years (LAHDC 2012), partly due to rural-urban migration. Cash-poor farmers, traditionally working with a barter-exchange economy, now depend on access to the urban monetary market.

Population growth has increased pressure on limited environmental resources. While soil erosion deteriorates in the west, the south and Changthang suffer from groundwater vulnerability and hiking trail fragmentation (Geneletti & Dawa 2009). Water is a key issue, with reliance on either meltwater or springs; water shortages downstream can arise due to upstream damming and reservoirs (Le Masson 2013). Although long-term climate change may increase immediate meltwater runoff, water supply may decrease in the long term (ibid.).

Networks for communicating risk and response are limited. Road access consists of two highways, Leh-Srinagar and Leh-Manali, both closed annually for 7 months with heavy winter snowfall. Of Leh’s 112 villages, 97 have a connected road, while the average distance to district headquarters is >180km (ibid). However, in an emergency, the Army base’s communication network is regularly maintained and updated. Airports (at Leh, and the Army base’s landing strip in Nyoma) provide regional transport infrastructure. The telephone operator BSNL connects most villages, whereas the other, Airtel, is more limited. While mobiles are increasingly used, radios are the most widely distributed, with near 100% coverage (Le Masson 2013).

Literacy rates in Ladakh are higher than the rest of India, but they are unequal for each gender: 89% male, and 65% female. While most speak Ladakhi with local variants, Hindi, Urdu, and English are taught from grade I. Despite compulsory education from 6-14, Leh district averages 35% pass at matriculation (LAHDC 2012). The restrictive national curriculum, and regular teacher rotation (or absence), fails to motivate locally relevant education (Mellon 2001). However, NGO combined with state reforms of 2005 have encouraged Ladakh-specific teaching, particularly of environmental constraints and impacts (SECMOL 2006; Dana 2007).

Potential short-term risks in Ladakh include landslides, avalanches, earthquakes, drought, and locus/disease hazards. A rare cloudburst over Leh and nearby villages in August 2010 delivered 14 inches of rain in 2 hours, resulting in flash floods and building collapses which killed over 200 people. Fatalities in the young and the elderly were disproportionately high, as may be expected (Gupta et al 2012). However, overall fatalities were 62% male, highlighting the interaction of age and gender in determining vulnerability. This may be explained by the high proportion of males living in the worst affected area of urban Leh

Community and religious affiliations are a key part of people's support networks. Relatives of victims were the primary source of aid after the cloudburst: supporting reconstruction, giving a portion of land, or helping find new employment (Le Masson 2013). Effective aid was also provided by some established NGOs, but some cash was misdirected towards constructing unsuitable shelters.

There are concerns that medical capacity could be insufficient for disaster response (Wiley 2002; Gupta et al 2012; Arsalaan et al 2012). For Leh district, there are 76 doctors (of whom, half are concentrated in Leh town), 55 nurses, and 40 Tibetan Buddhist Amchi practitioners (LAHDC 2012). Long-term pressure on the single equipped district hospital, in Leh is high; when this flooded, nearly all the injured had to be treated at the military hospital.

Financial risk adaptation occurs on a small scale. Informal insurance schemes can be popular, and the binding of the agricultural economy with village social structure means protection from loss is usually available; this may not be the case for rural-urban migrants. Formal financial insurance is limited, given the very few banking facilities outside of Leh, and high fixed interest rates (J&K Bank 2013); however, trade is protected by the many agricultural cooperatives (LAHDC 2012).

Under both India and Jammu & Kashmir disaster management, immediate responses to the cloudburst involved search-and-rescue, shelter, and food and water provision by the Indian forces. The Leh Indian Army base has the best (and most secure) emergency response facilities in the district. With the main BSNL telephone exchange destroyed, the Army provided a functioning line of national communication; as well as using their hospital, army air transport were able to air-lift critically injured to better medical facilities at Chandigarh.

Leh district's disaster management plan lays out the range of available facilities, infrastructure and communications for dealing with hazards (LAHDC DCO 2011). A disaster committee includes input from all major district departments; each block's headquarters has a 'control room' with a protocol for directing response to, and raising awareness of, hazards.

Ladakh faces a rising population, land use change, and a changing climate. In the face of this socio-economic complexity, understanding the vulnerability of different groups will be key to reducing risk in future disasters.

# 1. Social and economic aspects of Ladakh

## 1.1 Introduction

In an area slightly smaller than Portugal, Ladakh has a population density of about 3 people per km<sup>2</sup> (Table 1). Despite extreme topography, and a highly variable cold desert climate, agriculturalists have strategically managed the environment for perhaps 8,800 years (Miehe et al 2009). This report presents an overview of the nature, communication, and management of risk in Ladakh.

	Population (% of district)	Gender ratio (m:f)
<i>Leh district</i>	133,487	0.89
Leh block, urban area	35,324 (24%)	0.61
Leh block, rural	22,920 (15.6%)	0.86
Nyoma block	11,103 (7.6%)	0.93

Table 1: Demography of selected blocks in Leh district  
Source: LAHDC-Leh 2012

Ladakh gained geopolitical significance in the 1940s due to partitioning disputes with Pakistan to the north, and, since the 1960s, China to the east (Cons & Sanyal 2013; Figure 1). However, the infrequent border frictions have little negative impact on Ladakhis. In fact, the permanent Indian Army base benefits both the economy and infrastructure. On a regional political scale, Ladakh comes under the State of Jammu &

Kashmir. Since 1995, Ladakh has had its own Autonomous Hill Development Council, formed in recognition of its dissimilar regional population and governance issues (this was split in 2003 into LAHDC-Leh, and LAHDC-Kargil; Appendix a). There is some support for a separate Indian Union Territory of Ladakh. Pelliciardi (2010) notes that Ladakh is fundamentally a “constellation of villages”, captured into the Indian nation. The below highlights key aspects of different Ladakhi social and demographic groups, and their associated vulnerability to regional hazards.

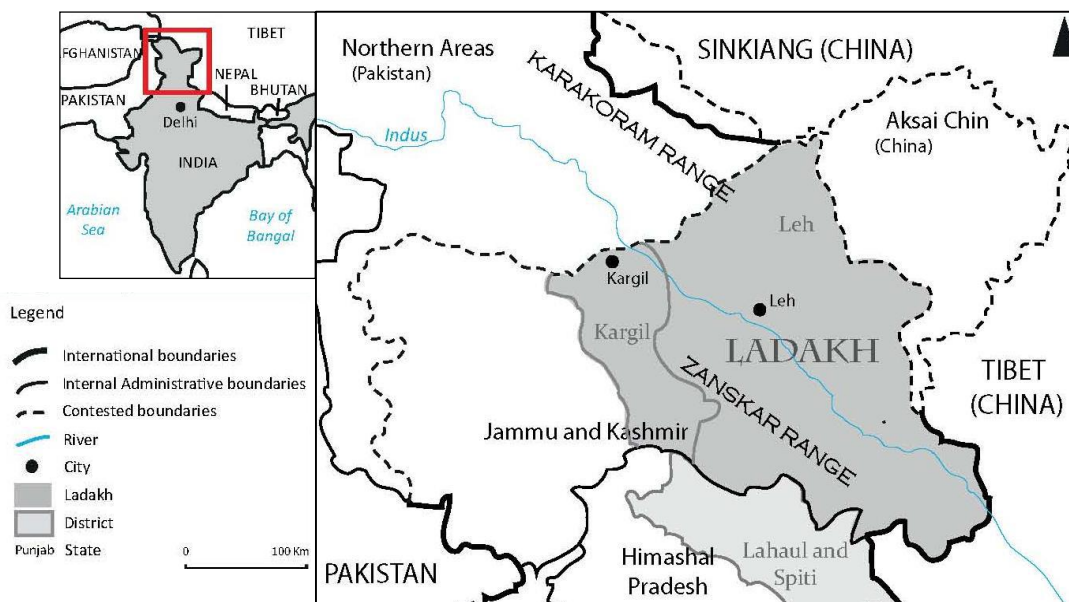


Figure 1: Political map of Ladakh, within India and Jammu & Kashmir state  
Adapted from Le Masson 2013  
Used with permission

The primary social unit is at the household level, while religion is seen to be equally important (Le Masson 2013:194). Hindi, Urdu, and English are taught from grade I, while most speak Ladakhi with

local variants. The Changpa speak a Tibetan dialect of Ladakhi. Leh's population is majority Buddhist and historically associated with Tibet, while Kargil (divided from Leh in 1972) is mostly Balti and Muslim Dards (originating from the northwest). Despite a long history of peace, conflicts between religious communities are more frequent with increasing population (Smith 2013), particularly in the denser, more competitive environment of Leh town. Nearly all activity is agricultural, with the exception of the large number of monasteries, and the major regional trading towns of Leh and Kargil. This is changing with increasing national and international influences: both becoming geopolitically integrated into India, and opening to tourism in 1974, have caused significant shifts in social structures. This report focuses on Leh, as although Kargil is Islamic and slightly wealthier, it shares common attributes in terms of socio-economic structure with Leh. In addition, this report is commissioned for project work that will take place in Leh.

## **1.2 Agriculture, property and the economy**

Historically, subsistence agriculture has formed the organising structure of both society and the economy (see LAHDC-Leh 2011). With scarce water availability (almost no rainfall, and a reliance on glacial meltwater channels and springs), the villages are scattered between small areas of land in the river valleys of the Indus, and its tributaries Shayok and Zaskar. Pastoral herding of yak, sheep and goats suits both nomadic and settled communities, while the latter also cultivate barley, wheat and peas, and increasingly horticulture (apricots, apples). Seasonal patterns of agricultural production drive village activity. Pastoralists trade dairy, wool, and most lucratively, pashmina goat fibre to the Kashmiri region. The arable agricultural schedule is tightly constrained: the growing season is extremely short (between May and September). Sowing occurs between 15<sup>th</sup> April – 25<sup>th</sup> May, and harvesting between 15<sup>th</sup> August and September (LAHDC-Leh 2012). As a result, farmers in Ladakh are extremely risk-averse in adopting untested technology (Angchok & Srivastava 2012).

Property is divided according to agricultural requirements. Villages have traditional and complex techniques for channelling irrigation; water is allocated by village and household, and if scarce, mediated by the *chhu-pon* (Lord of water), an elected village official. The high value and insecurity of water can make distribution a very politicised issue (Angchok & Singh 2006). Private land property is very rarely consolidated, as land is usually spread across different altitudes suitable for different times of the year (grazing sheep & goats at higher altitudes in winter, growing wheat/barley at lower altitudes nearer the built village during the summer). In winter, private property is converted into common public land – it cannot be used for agriculture, so livestock are allowed to roam.

Agriculture also determines social movements, as in winter the entire household might move up to the pastureland if tending a large herd (300+ livestock). School age children, and the elderly, usually remain in the village year-round (Pellicciardi 2010a). Movement is based on income diversification, since village-based commercial enterprises are also a factor in the pastureland/village/town migration. Trading agricultural surplus is usually organised through the localised cooperatives, which ensure both farmers and consumers receive an affordable price (for example, organising the sale of vegetables to the Army base; LAHDC-Leh 2011). Goods are also traded between villages, and previously with travellers across Asia; this is based around a strong bartering exchange economy.

## **1.3 Social and economic shifts**

Major social and economic shifts occurred during Indian integration and border closures. Particularly the introduction of Indian food rationing, which subsidises basic foodstuffs under the Public Distribution System, has encouraged a cash economy. In some cases this forced the sale of livestock to

meet basic needs that were no longer payable in barter goods. This shift in balance between self-sufficiency and high dependency is much debated (e.g. 40% of food is now imported, but also more nutritious; see Dame and Nusser 2011).

These changes have further increased the importance of Leh and Kargil towns, as they provide access to the regional and national market. Leh is the centre of economic activity, and has been growing rapidly since the Ladakh Autonomous Development Council were granted planning powers in 1995 (LAHDC-Leh 2011). Integration with the national economy has meant improved access to resources, and increased investment in physical infrastructure. As well as a ready market, the Army base acts as a crucial link to national funding. Major change has been driven by opening to tourism in 1974. This has created thousands of jobs, about £25 million in revenue during 2011, and contributes up to 50% of the region's GDP (reviewed in Pelliciaridi 2010b). This has also created multiple tensions. Year-to-year tourist numbers (a majority Indian, with European & American hikers) highly fluctuate; seasonally, tourism is exclusively in the summer, almost exactly matching the peak of activity in the agricultural calendar. For the villages, Leh town attracts rural-urban migrants, given employment opportunities in tourism, as well as civil government and defence (to an extent, this has also altered community social status rankings to Indian rather than Ladakhi standards; Le Masson 2013).

#### **1.4 Environmental resources & change**

The combination of growth in urban functions and a consumer cash economy has increased the stress on limited environmental resources. This varies with region: soil erosion is high in the west, bordering Kargil, while groundwater vulnerability and trail fragmentation are problems in the south and Changthang (Geneletti & Dawa 2009). Water is a particular issue, with reliance on either meltwater or springs; there have been some reports of water shortages downstream due to upstream damming and reservoirs. Some water-intensive activity, such as horticulture, requires water to be purchased from water trucks (Le Masson 2013).

There is uncertainty surrounding the vulnerability of Ladakh to long-term climate change. Changes to temperature and winter snowfall are fundamental to water availability; this may increase meltwater runoff, while decreasing water supply in the long term. Annual climatic changes are extreme (reviewed in Le Masson 2013), with large temperature swings between summer and winter.



## 2. The Changpa tribe

The Changpa tribe are a social group that *Geology for Global Development* will be working with during their project work, and so have a particular focus in this report. Changthang region (Figure 2) falls between Durbook and Nyoma administrative blocks in the south, bordering Tibet/China to the east. Within the Nyoma block, the nomadic Changpas move over pastures in the Rhupshu-Kharnak Rangeland: subsisting and trading produce from large herds of sheep and goats, with yak and horses used for transport. The extremity of environmental conditions results in high insecurity for the nomadic lifestyle. However, there are correspondingly complex processes of risk reduction: for example, if the usual grazing land is unsuitable, e.g. if access is blocked by landslides, groups maintain reserve pastures (Chaudhuri 2000).

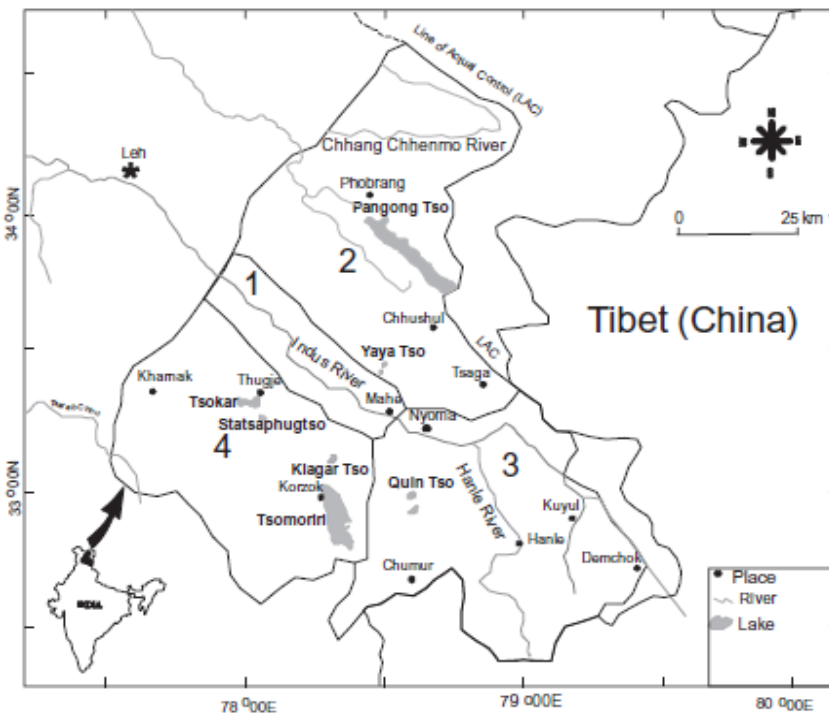


Figure 2: Map of Changthang, Ladakh. (Numbers refer to original publication's surveyed areas) Source: Namgail et al 2010

There are three main Changpa communities: Sarnad, Korzok, and Kharnak. These form the permanent bases, or structures used for storage and winter settlement. However, there are 14 groups of Changpas, averaging 130 families each. Land is common property, and regulated according to community needs. Moves are directed by the elected headman (*gompa*), between allocated pastures. With 6-10 moves per year, each group has its own system of organisation, building from the core structure of the household (*rebo*).

A polyandrous family structure has traditionally been the most efficient for man-power, and the majority of decision-power lies with the male head of household. While production (herding, milking, shearing) is divided between men and women, men almost exclusively conduct trade and exchange of goods. Women have some access to individual means of production in trading handloom and weaving work (although this adds considerably to their existing burden of labour). Younger, unmarried members of the household are the most free. With girls having least household influence, it is younger brothers who catalyse social change, where they are free to migrate to Leh, or chose monogamous marriage, as they wish.

Social and economic changes interrelate with the growth of Ladakh and the opening of rangelands to tourists (Goodall 2004; Namgail et al 2010). Firstly, border wars, with Pakistan and particularly the 1960s war with China, have greatly restricted available pastures. This has also caused some tension and competition for resources with an influx of similarly nomadic Tibetan refugees. Secondly, the increasing use of a cash economy has affected the Changpas even more than settled villagers. Lacking cash resources, and previously reliant on nearby agriculturalists for staples (eg trading wool for grain), there has been a trend of urban migration to diversify income. The key drivers of migration are seeking access to children's education and health in urban areas. To an extent, migration is also driven by perceived standard of living; Leh and a consumer lifestyle is thought more fashionable and better than Changpa nomadism (Le Masson 2013). However, with a skill-set limited to nomadic pastoralism, migration has not often succeeded; the Leh lifestyle can also be unfamiliar and difficult to adapt to (Chaudhuri 2000).

Formal education was limited or non-existent, until the installation of a purpose built school in Puga in 2005. Children from the the Changpa tribe spend the winter months with their families, living a nomadic lifestyle, and are delivered to a boarding school to receive an education during the summer. For many of these children, they are the first in their family to receive formal education.

### **3. Communication**

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#### **3.1 Infrastructure**

Networks for communicating risk and response are limited; another name for Ladakh is the Hermit Kingdom (LAHDC-Leh 2011:13). Road access consists of two highways, Leh-Srinagar and Leh-Manali. These are closed annually for 7 months with heavy winter snowfall. Of Leh's 112 villages, 97 have a connected road, while the average distance to district headquarters is >180km (ibid). However, in an emergency, the Army base's communication network is regularly maintained and updated, and proved crucial to the 2010 flooding by providing immediate links to a state and national response (see below).

With the cash economy and foreign imports, motor vehicles are becoming necessary as the quickest and easiest transport. For example, even in the extremely isolated border area of the Hemla valley, some of the Changpa population own trucks and cars (Chaurdhuri 2000). Otherwise, transport (in particular for the nomadic moves of the Changpas) is by yak and horse. Airports are the other regional transport infrastructure. The airport at Leh is directly connected to Delhi, and the Army base has recently built an airstrip in Nyoma; helicopters were the main source of emergency transport following the 2010 cloudburst. The construction of a Bilaspur-Manali-Leh railway has begun, but has been significantly delayed and under-funded (Time of India 2013).

Communications infrastructure includes 56 telegraph and post offices. Telephone and mobile communications are supported, although not common. The physical infrastructure of the main regional telephone operator, BSNL, connects most villages; however, this is vulnerable where its main exchange in Leh was destroyed in the 2010 flood, taking 10 days to repair (Gupta et al 2012). The other operator, Airtel, is more limited in coverage (not extending as far into rural areas). Mobile phones and signal are increasingly available, and are more frequently used than landline connections. Radios are the most widely distributed source of information, with near 100% coverage, while TVs and internet access are mostly limited to Leh or Kargil towns or wealthier villages (Le Masson 2013).

#### **3.2 Education**

Formalising knowledge of specific risks in Ladakh through education has been only recently successful. Literacy rates in Ladakh are higher than those of India as a whole; averages are 89% male, and 65% female. However, national education schemes based on a fixed curriculum are poorly implemented, due to the distinct geography and social groups of Ladakh. Education is free and compulsory from ages 6-14 (grades I-VI as primary, grades VII-X secondary school), with an optional 2 further years at secondary higher school (XI-XII). The vast majority of schools are governmental (see table 2). They are notoriously low quality, especially outside of Leh town. Ladakh is perceived as a "punishment posting", by government teachers on compulsory regional rotations, and teacher absenteeism can be high (Mellor 2001; SECMOL 2006).

#### **3.3 Localised education initiatives**

The influx of tourists and "globalising" influences has incentivised local organisations to promote traditional Ladakhi cultural education, chiefly driven by the Student Education and Cultural Movement of Ladakh (SECMOL). In 2005-6, SECMOL initiated "Operation New Hope" for education. Together with

the LAHDC, they produced very detailed reports outlining the state of educational facilities and experiences in Ladakh: the classroom environment, textbook material, teacher training and motivation, etc. They recommended specific regional adaptations of national textbooks to include local, familiar illustrations, and relevant topics of environmental pollution; they also designed a “Life and Livelihoods” course for grades 6-8. These working papers are accessible online (see SECMOL 2006). SECMOL also set up the boarding school campus at Phey, the summer school in Changthang, local Village Education Committees, and prompted various cultural education schemes (for a review of SECMOL’s “globalization from below” see Dana 2007). Moreover, there have been various popular environmental education initiatives focussing on the sustainability of Ladakh. For example, in Leh, the ‘Socially Engaged Buddhist of Ladakh’ recently (November 2013) hosted a 6 day workshop on “Holistic Education of our Planet Earth”: this included the frequency and vulnerability of potential damage, soil erosion, types of pollution, and other environmental issues (for presentations and photographs see SEBoL 2013). This suggests there is a lack, but growing provision, of communicating environmental awareness of the risks from land and water pollution.

	<i>Government schools</i>	<i>Private schools</i>	<i>Teachers</i>	<i>Trained teachers</i>	<i>Matriculation pass %</i>	<i>Higher secondary pass %</i>	<i>Number enrolled, government schools</i>	<i>Average % female, government schools</i>
<b>Leh district</b>	351	41	1,842 (19% in primary; 43% middle; 38% in higher schools)	61%	35 (n=661)	26.4% (n=406)	8,641	53%
<b>Leh block</b>	55	20	376 (+15 college teachers)	70%	30% (n=128)	43.5% (n=183)	1,931 (45% higher, 41% middle)	55%
<b>Nyoma block</b>	41 (42% primary, 51% middle schools)	0	141	58%  (primary schools: 33%)	38.5% (n=39)	2% (n=25)	736  (43% in middle school)	55%

Table 2. Selected education statistics for 2011-12 in Leh. Source: LAHDC-Leh 2012

## 4. The future: adaptive capacity

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### 4.1 Introduction

Potential short-term risks include landslides, avalanches, earthquakes, drought, and locusts/disease hazards. Although adapting to risk primarily occurs at household scale, the 2010 cloudburst pushed hazard management to be put into an institutional framework.

The August 2010 cloudburst created 14 inches of rain in 2 hours, causing flash floods in the area surrounding Leh, exacerbated in nearby Choglamsar by dry meltwater river channels. Over 200 people died, with 800 missing. Fatalities in the young and the elderly were disproportionately high, as may be expected (Gupta et al 2012). However, overall fatalities were 62% male, highlighting the interaction of age and gender in determining vulnerability. This may be explained by the high proportion of males living in the worst affected area of urban Leh. Extensive damage was due to the force of the water, debris, and building collapse (affecting over 1000 buildings, as adobe mud brick construction is unable to withstand heavy rain). Key infrastructure was severely impaired: 7 bridges and many roads were either washed away or blocked by debris, and flooding damaged Leh airport, as well as the district hospital in Leh, which remained closed for 3 days (Gupta et al 2012). Public works damage is estimated at 133 crore rupees, or about £44 million (LAHDC-Leh DCO 2011; author's conversion to purchasing power parity rate, to GBP, of 2010).

Two sources of aid were crucial in immediate disaster response: intra-community support, and the institutional mobilisation of Army resources. Household-scale management primarily involves social support networks, drawn from religious and community ties. Mutual assistance is a strong tradition, sometimes formalised in a "pashpun", a grouping of households to organise harvesting and festivals (Le Masson:192). This was the most crucial source of aid in the aftermath of the 2010 cloudburst. Relatives gave over portions of land, supported reconstruction, or helped find new employment (ibid.). Overall, social support from relatives is the strongest form of household and community scale adaptation to hazards in both the short and long term.

The Army base has the fullest (and most secure) emergency response, communication, and medical facilities in the district. The cloudburst response involved nationally-linked communications, enabling the direct involvement of national response teams, heavy-lifting equipment, and crucially the fully-functioning hospital, which dealt with nearly all casualties as the district hospital was severely flooded. Army air transport was also able to air-lift critically injured to better medical facilities at Chandigarh. With the main BSNL telephone line destroyed, the Army provided a functioning line of communication, which enabled national-scale aid (see below).

### 4.2 Societal resilience

Health and medical facilities were managed in the short term after the 2010 disaster, although in a long term context these are much more limited. Medical care involves both biomedicine and traditional Tibetan Amchi; Leh district has 76 doctors, and 41 Amchi practitioners<sup>1</sup>. Although there are 138 medical sub-centres, which are intended to be used as the first local point-of-call, many prefer to travel

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<sup>1</sup> It is difficult to know the effectiveness of the Amchi; they are supported as scientifically and technically sound, in Pordié 2010, but debated, in Wiley 2002.

to the single district hospital in Leh (Wiley 2002). Despite its overfull capacity and lack of resources, this tends to be used by citizens over the also publicly open and well-equipped military hospital (ibid.). The district hospital is the only other centre with facilities such as scanning and operating equipment, and is acknowledged to be insufficiently prepared for disaster response (Gupta et al 2012; Arsalaan et al 2012).

Religion provides key community support. Monasteries and faith-based NGOs provided physical shelter and provisions, and spiritual relief. Ozer (2010) suggests that long-term aid depends on the particular faith and its version of karma. While the acceptance of fate can motivate a positive response to unfortunate events, some versions attribute individual blame for bad events and ill health, especially so for women or psychological issues. Differing Islamic and Buddhist affiliations could potentially create a divisive community response, although none were found in literature discussing the cloudburst. This is more likely to be an issue for long-term management of resources, for example where irrigation of land and clean water supplies are vital and increasingly scarce.

There is a “culture of NGOs” in Leh (Choudhary 2011); 36 were involved in response to the cloudburst. The most efficient were the long established organisations, including the WWF, Save the Children, the Red Cross, SECMOL, or the LEDG (Ladakh Ecological Development Group). Some NGOs, however, did little to help, constructed unsuitable shelters, or used the aftermath for profitable exploitation (Chaudhary 2011).

#### **4.3 Economic resilience**

Long-term financial risk adaptation also occurs at a small scale. Informal insurance schemes can be popular, and the binding of the agricultural economy with social structure means protection from loss is usually available. For example (applying to both agriculturalists, and the Changpas), the *gompa* regularly collects taxes for community funds (Chaudurhi 2000). Again, however, this is changing with the growth of the urban/monetary economy. Migrants are forced to either continue paying taxes in the village, even while they are in Leh, or stop paying and thus cut all ties and social protection. This creates high vulnerability where migration is unsuccessful.

Formal financial insurance is limited. There are two banks in the region, State National Bank, and J&K Bank. Although there is a high savings rate, there is little uptake of formalised insurance schemes (J&K Bank 2013) – perhaps given the very few banking facilities outside of Leh and fixed interest rates of up to 20%. However, formal banking may be unnecessary with the major role of co-operatives in protecting trade: some of these schemes maintain considerable working capital (LAHDC-Leh 2012). Cooperatives are chiefly for agriculture, however, and there are few protecting other income sources e.g. handcrafts.

#### **4.4 Institutional planning**

Institutional planning for disaster response is formulated at national, state and district scales. The recent Indian Disaster Risk Management Programme has encouraged preparation and planning rather than emphasising relief. Jammu & Kashmir has a reasonably well-detailed disaster management plan that deals broadly with the variety of earthquakes, droughts, and fires in the state (DRRR 2011). National and state responses to the cloudburst involved search-and-rescue and shelter provision by the Indian forces, as well as air-lifting in food and water supplies, of critical importance with high import

dependency. After the Leh cloudburst, some reconstruction and funding was badly planned, for example, pre-fab shelters were mismatched and unsuitable for climatic extremes (Kaur 2011).

More specifically, Leh's recently formalised (post-2010 cloudburst) disaster management plan lays out the range of available facilities, infrastructure and communications for dealing with emergency hazards (LAHDC-Leh DCO 2011). A disaster committee is formed with the input of all major district departments; each block's headquarters has a "control room" with a protocol for directing response to, and raising awareness of, hazards. Examples include identifying citizens who own heavy-lifting machinery to be mobilised in hazard response, and proposed education programmes to raise public awareness. The detailed delegation of duties and contact details listed in the plan appears strong and well planned. It is difficult to gauge how successful this may be upon implementation. For example, many duties are listed as delegated to NGOs and sub-committees: preparation includes meetings and drills, but the diversity of organisations involved may not be coordinated in emergency response.

Long-term institutional management is structured by the LAHDC's 5-year (economic) plans. Additionally, dealing with a rapidly rising population (more than doubling in 30 years, to 145,000 in 2001), and associated grain and water shortages, the LAHDC-Leh proposed a "2025 Vision Document" in 2005. This suggested sustainability through increased irrigation and emphasis on regional cultural practices (e.g. polyandry as a traditional population control).

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## Appendix A: Commonly used administrative divisions of Leh district, Ladakh

Source: LAHDC-Leh 2011

Villages	Panchayats / Blocks < Tehsils: groups of villages with individual administration	District	Region	State
112	9 blocks, within 3 tehsils Nyoma block, within the Changthang region, is the main district of the Changpas (see text)	Leh	Ladakh	Jammu & Kashmir
129	6 blocks, contained within 2 tehsils	Kargil		