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# The Effects of Foot and Mouth Disease in Yak and Ruminant Population of Rasuwa District in Nepal in The Context of Climate Change and Its Implications Toward Livelihoods of Transhumance

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## Abstract

The paper examines the foot and Mouth Disease in livestock especially on yak and ruminant animals. It also examines the fact that in the age of climate change, pasture management, inter alia, is vital to provide additional income to the people in highland Rasuwa. It spotlights the importance of gender sensitive and socially inclusive policies and strategies to ensure good governance. It examines the role of traditional customary headman and the local institutions in managing natural resources including pasture land, which is a vital source of grass and fodder for cattle and milk animal in transhumance farming system. It also points to risk factors, i.e., foot and mouth disease and nutrient deficiency in terms of good grass and fodders. The paper concludes exposing the limitation between vital human-livestock management support and limited modern institutional governance system including animal health extension and market outlets to support the highland community.

**Keywords:** Customary Law; Foot and Mouth Disease; Gender Equality; Governance; Livelihoods; Rangeland Management; Traditional Institution; Transhumance

## Introduction

Socio-culturally constructed gender roles and responsibilities not only shape women and men's differential access, ownership and control over resources but also influence their capacities and capabilities to adapt to climate change (Skinner, 2011). Women's and socially marginalized community member's vulnerability to climate change related hazards are different from that of general milieu to a great degree (Neumayer and Plumper, 2007). For instance, when disasters related to too much and too little water hit, more women and socially marginalized community members die because of lack of information, timely communication, mobility, decision-making, access to resources, capacity building training, including gender-biased cultural norms and barriers (Nellemann, Verma and Hislop, 2011:37).

However, dominant climate change adaptation approaches and methodologies tend to be gender and social inclusion (GESI) blind, as biophysical and economic determinants receive greater weight (Nightingale, 2009). They also fail as more than half of the population are excluded from development efforts geared toward climate change adaptation [1]. It is therefore, critically important that this research shed light on how gender equality and social inclusion issues are addressed at the grassroots level. In order to contribute to filling gaps in knowledge, and to understand gender and social vulnerabilities in climate change context; a number of key research questions need to be answered. These are:

- What are the GESI differentiated impacts of climate induced hazards and shocks in the highland Himalayan communities?
- How are these disadvantaged community members coping in terms of labour, decision-making and access to and control over key resources including livestock population?
- What are the existing traditional Gender Equality and Social Inclusion (GESI) modes of autonomous adaptation and engagement with institutions in efforts to ensure livelihoods including food, water security, income and employment?
- How different women's and men's access, control and ownership of common property, i.e. rangeland, farmer managed

irrigation or community forestry that impact their livelihoods in response to climate and other drivers of change? And

- What are some of the risk factors, i.e. livestock related diseases that create vulnerability to human population in terms of health and livelihood vulnerabilities?

## Conceptual Framework

Early definitions of vulnerability used within climate change stemmed from the study of natural hazards in which vulnerability was perceived as biophysically induced, i.e., the outcome of external hazardous events. Until the 1980s social scientists utilized largely biophysical definitions of vulnerability (Adger, 1999; Hewitt, 1983). Starting with Wisner (1978) and Hewitt (1983), a paradigm shift began within which there was a growing recognition that impacts of hazardous events, even within small geographic areas, are not homogenous and that it is not just the biophysical characteristics of an event that determine vulnerability but rather social structure plays important role. Social vulnerability reflects that pre-existing internal conditions and structures of a society that determine social positioning which in turn results in "the differential capacity of groups and individuals to deal with hazards" (Dow, 1992; Gerlitz et al., 2014; Hewitt, 1983) and the differential impacts of a hazard on a population.

An important facet of vulnerability is the lack of gender equality and social inclusion (GESI) approach and existing reality. This means that men and women experience climatic change and associated hazard events differently (Aguilar, 2009; Alston, 2014; Brody, Demetriades and Esplen, 2008; Lambrou and Laub, 2004; Lambrou and Piana, 2006; Terry, 2009). An emerging body of material, much of it from the gender and disaster literature, provides abundant empirical evidence of the myriad ways in which women, men and various socio-economic groups experience and suffer crisis situations differently. This suggests that effects of climate changes are not gender neutral and that women, girls and the poor or excluded tend to be more vulnerable to hazard events, compared to even the men of particular location or category of the same society. Furthermore, these impacts can further exacerbate already existing inequalities, which in turn can compound vulnerabilities (Bennett, 2005; Brody, Demetriades and Esplen, 2008; Hannan, 2002; Lambrou and Laub, 2004; Neumayer and Plumper, 2007).

However, women and girls are not inherently vulnerable to climate change impact (Dankelman, 2002; Sultana, 2010; Wisner, Blaikie, Cannon, and Davis, 2003) because, it is not female gender itself that marks vulnerability. It is rather the lack of gender equality and social inclusion (GESI) in a specific situation, shaped by socio-cultural setting, together with gendered roles of reproduction that determine the consequences. Gender and gendered differences are socially constructed, reflecting the situated social and cultural norms at a particular spatial and temporal juncture. These constructions are not constant but performative, unstable, ever changing and situational over time to reflect evolving realities (Butler, 1988; West and Zimmerman, 1987). Furthermore, GESI experiences are not homogenous (Sultana, 2010) and the tendency to "binaries" gendered experience to over-simplifications of only male and female gender do not present realities [2].

Recognition of heterogeneity within men, women plus socio-economic" intersectionality' is important. It is crucial to recognize that GESI "intersects" with other axes of social differences, such as ethnicity, age, class, caste, or religion etc., resulting in a mutually constitutive identity (Barager, 2009; Motzafi-Haller and Abu-Rabia-Queder, 2009; Yuval-Davis, 2006). It is, therefore, the specific combinations of these "intersecting" axes of social differences that shape "social" and "gendered" positions as lived experiences and thus affect vulnerability" (Osborne, 2015:131). When integrating GESI into understanding vulnerability to climate change impacts, it is therefore, critical to ensure "more agile understandings of women, men and different social groups" (Resurrección, 2013, p. 41) that reflect how gendered experiences are the outcome of such "intersectionality"(Aguilar, 2009; Ahmed and Fajber, 2009; Arora-Jonsson, 2011; Brody, Demetriades and Esplen, 2008; Enarson, 2000; Lambrou and Piana, 2006; Mitchell, Tanner, and Lussier, 2007; Osborne, 2013).

Hence, in this case study of highland Rasuwa–the conceptualize manifestations of GESI and vulnerabilities in the climate change context is juxtaposed as "interplay" of "external factors" with existing "internal environment" and age old situations. These are market forces, consumerism, urbanization, globalization, infrastructure development and technological intervention in a place and time. This is further related to internal geo-political and socioeconomic factors of social structure, gender structure, geography, political economy and decision making processes and institutions. They combine to alter or influence the livelihood options of women and men, determining the capability to respond to risk posed by climatic and socioeconomic stressors.

(Conceptual Framework of Gendered Vulnerability, ICIMOD/HI-AWARE 2017). This conceptual framework can be adapted to a simple version of the Sustainable Livelihoods framework. The Sustainable Livelihoods framework outlines five aspects which are termed as "capitals" - human capital, financial capital, social capital, natural capital and physical capital – for livelihoods (Sustainable Livelihoods Framework, DFID - UK, 2001 AD) [3]. Furthermore, another element, i.e. – Political capital has been added to it in order to capture the civic dimension. Referring to social capital, one can consider informal and kinship relations as important element in the livelihoods coping strategy in the mountain environment (Figure 1and 2).

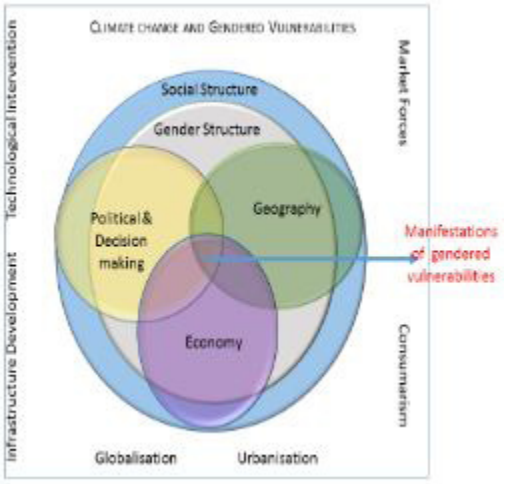


**Figure 1:** Conceptual Framework of Climate Change and GESI related Vulnerabilities.

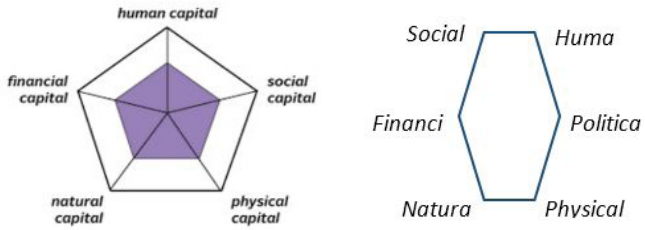


**Figure 2:** Sustainable Livelihoods Framework Adapted version.

(Sustainable Livelihood Framework, DFID - UK, 2001 & Conceptual Framework of Gendered Vulnerability, ICIMOD/HI-AWARE 2017).

## Methodology

### The Study Area

The study area is in Rasuwa District, a rugged, high mountain region of central Nepal. Over 60% of the district is over 3,000 meters above mean sea level, and many areas have no road access (Tamang 2016). The roads that do exist are rough and poorly maintained. Rasuwa was one of the worst-affected districts by the earthquakes that occurred in April and May 2015 (Rasul et al. 2015). There are almost no data on rainfall, temperature, and soils in the higher regions of Rasuwa, except for some recent measurements in the Langtang river basin (e.g. Immerzeel et al. 2014). In general, the hottest periods are during the pre-monsoon and monsoon periods; the southwest monsoon from mid-June to September produces most of the annual rainfall. Rainfall, snowfall as well as temperatures vary considerably, based on altitude.

In Rasuwa District, most people are Tamang, of Tibetan origin, and have been in the area for at least 300 years (McVeigh 2004). The district is situated in the North-West part of the Central Development Region, about 120 kilometres North from Kathmandu, the capital city of Nepal (Neupane and Devkota 2017). Based on preliminary information, three specific sites, Gatlang, Goljung, and Chilime, were identified for in-depth field data collection (Figure 1). The altitude of these sites varies from 1700-2600metres above mean sea level (Table 1). This variation provided wider scope to examine the differences in irrigation systems, agriculture, and livelihoods of local people based on altitude. Our researchers visited community settlements, agricultural fields and irrigation systems to observe community life, cropping patterns and water management practices at three study sites (Figure 3).


**Figure 3:** Case Study Sites in Rasuwa District, Nepal.

### Data Collection and Analysis

Our study collected data over 30 days six days (1 June to 30 June 2016) following qualitative methods such as focus group discussions (FGDs), key informant interviews, and observations (Table 1) to study the nuances of gendered vulnerabilities of climate change from peoples' perspectives in-depth. We also drew up some case studies. The in-depth qualitative investigation of climate change has become a major field in the past decade (Crate and Nuttall 2009; Rudiak - Gould 2011).

| Indicators/tools | | Gatlang | Goljung | Chilime | Total Participants |
|---|---|---|---|---|---|
| Altitude(above mean sea level) | | 2500 m | 1800 m | 1700 m | |
| Administrative status | | VDC | VDC | VDC | |
| Focus group Discussions (FGDs) | Female participants | 70(46%) | 10 (100%) | 37 (67%) | 117 (54%) |
| | Male participants | 83(54%) | ---- | 18 (33%) | 101 (46%) |
| | Sub Total participants | 153(100%) | 10 (100%) | 55 (100%) | 218 (100%) |
| | Total FGD participants | Female FGDs 24 | Male FGDs 16 | 218 mixed participants | |
| FGDs: Focus Group Discussions, VDC: Village Development Committee. (Source: Focus Group Discussions (FGDs), June 2017 in Upstream Rasuwa, HI-AWARE ICIMOD/SEARCH Nepal). | | | | | |

**Table 1:** Rasuwa District Case Sites.

This study was designed exclusively as an in-depth qualitative study. Altogether, 40 focus group discussions (FGDs) were accomplished in the three hamlets. These FGDs were conducted with 24 women and 16 men groups. Altogether, 12 different sites within these three hamlets were selected purposefully based on ethnicity, socio-economic factors, occupation, migration, livelihood opportunities and opportunities for employment in hydropower projects or local tourism where international tourists visit the mountain trails. An eight-member team of four men and women field researchers conducted the FGDs in pairs of one woman and man each. One facilitated the discussion while the other recorded the notes and made observations. Besides, interviews with 3-4 women and men Key Informant Persons (KIP) were accomplished in each of the 12 sites. The field researchers furthermore noted the community life and their coping strategies in terms of the key research questions noted above. Furthermore, the Livelihood Framework was utilized to frame the semi-structured checklist for FGDs as well as for KIP interviews and field observations. A field note guided the researchers in their research endeavours. The field researchers were trained for a week in Kathmandu and all the research instruments translated into local Tamang language [4].

A semi-structured checklist helped the field researcher undertake all FGDs, KIP discussion, field observations and participant observations in the field. Each evening the team members documented their findings along the prescribed format of field reporting along the research questions. These notes were then cross-checked and validated by the field team leader and kept confidentially in a suitcase. The field reports were then handed to the Principle Researcher in Kathmandu for analysis of the field report and final report. The field researchers were then interviewed in a final debriefing of 2.5 hours to ensure their final observations to the field research endeavours from each of their sites.

## Results

### Lives and Livelihoods of the Transhumance Herders

Based on a number of FGDs data, this section narrates gender roles and responsibilities of different gender social groups in the study area and focus on one aspect of livelihoods, i.e. transhumance herding. The "intersectionality" in highland Rasuwa is multifarious, hinging inter alia on geography, economy, socio-cultural, material, physical and political elements. The altitudes vary from 2,200 m above msl in Gatlang to 1,800m amsl in Goljung and 1,700m above msl in Thambuchet/Chilime (AMSL (amsl) denotes height in meters from above mean sea level. Those indicated altitudes are for hamlets where inhabitants live). In terms of "aspect", these hamlets vary considerably, as well - being either on the "windward" or "leeward" side of the mountain (Village Development Committee (VDC) has been restructured under the New Constitution, 2015 and the Federal System in Nepal and subsumed into Rural Municipalities *(Goan Palika)* or Local Governments (LG). There are currently 753 LG disaggregated into 6 metropolitans; 11 sub-metropolitan; 276 Municipalities; 460 Rural Municipalities). These hamlets, thus, face north-west, north or south-east directions. These "aspects" have considerable influence in the local weather patterns in the high mountains with its massive ramparts; dictating unique "human living conditions", i.e., agriculture, livestock/transhumance or sale of labour for livelihoods and sustenance.

In terms of socio-economic mosaic, the communities are a mix of Tibeto-Burman speaking majority Tamang, followed by "close-cousin" Ghale and Indo-Aryan Nepali speaking Dalit

(In meteorology, leeward and windward are technical names for the directional sides of a mountain. The windward side is that side which faces the prevailing wind (upwind), whereas the leeward, or "lee" side, is the side sheltered from the wind by the mountain's very elevation (downwind)). A majority of them are subsistence farmers and pastoralists and most of them have around six months or less of food self-sufficiency indicating two full meals and two snack meals a day. They are thus extremely vulnerable to local weather patterns and vagaries of climate variability and change. It leads to a set of adaptation skills, in order to cope with the local peculiarities and environmental situations, thus enabling them to cope and survive in the high mountains.

Examining these high mountain communities, one finds a pattern of dominant gendered roles and responsibilities which are centered on, at least, seven major activities and these are:

- Agriculture,
- Livestock rearing/transhumance pastoralist,
- Eco-tourism/home stay,
- Labour within village,
- Internal and international labour out-migration,
- Small trade/business, plus
- Services and employment within and outside the hamlets.

The livelihoods activity for daily sustenance in upstream Rasuwa is dominated by Agriculture followed by Livestock rearing. The main crops grown are potato, maize, millet, barley, rye, beans, low land rice and mashur lentil (HI-AWARE, 2016) [5]. (A Study on Socioeconomic Conditions and Drivers leading to Vulnerabilities in Upstream of Gandaki Basin: A case of Rasuwa District, HI-AWARE, ICIMOD/SEARCH Nepal) Other significant livelihood activities are ecotourism, eco-tourism/home stay; labour within and outside the village including providing labour or services to over a dozen hydropower plants, small trade/business, handicrafts plus internal and international labour out-migration (Ibid & ICIMOD, 2016) (Productive agricultural land in rural Nepal are divided into Khet land, Bari Land and Kharbari land which denotes irrigable wet land suitable for rice farming; rain-fed dry land which may or may not be suitable for rice cultivation with irrigation; and pasture or fodder suitable land) (Table 2).

| Characteristics | Gatlang | Goljung | Chilime | Remark |
|---|---|---|---|---|
| Number of households | 400 (513)*Tamang Ghale Dalits | 269 Tamang Ghale Dalits | 340 Tamang Ghale Dalits | *Increased after the earthquake due to family fragmentation |
| Average landholding size | 12 ropanis | 12 ropanis | 12 ropanis | A ropanis is 74 feet times 74 feet or 5,476 square feet and most of the lands are bari land meaning it is rain fed agriculture land. |
| Main income sources | Agriculture Livestock Tourist services Remittances Employment in local cheese factory, benefit from shares in HP | Agriculture Livestock Tourist services Remittances Handcrafts, benefit from shares in HP | Agriculture Livestock Tourist services Local labor and employment in hydro power, benefit from shares in HP | |
| % households with out-migrants | 50-55% | 15-20% | 15% | Out-migration started from 1990 onwards |
| (Source: Focus Group Discussions (FGDs), June 2017 in Upstream Rasuwa, HI-AWARE ICIMOD/SEARCH Nepal). | | | | |

**Table 2:** Socioeconomic Characteristics of Case Study Sites.

The main income-generating crops in these villages are potato, barley and local species of beans. Farmers reported that on average, each household sells 40 bags of potato (50kg/bag) every year, thus, making this cash crop and important source of income. Fresh green vegetables are grown currently for consumption and sale as a result of opening of roads and efforts of development projects including non-governmental organizations or NGOs *(*HI-AWARE, 2016 Socio-economic vulnerabilities and high Mountain agriculture field studies) [6].

| Characteristics | Gatlang | Goljung | Chilime |
|---|---|---|---|
| Main food crops | Local maize, millets, buckwheat, local beans | Rice, lentils, soybean, other local bean, potato | Rice, beans, barley, millets, potato |
| Main cash crops | Potato, barley and beans | Potato, lentils, mustard, linseed | Rice, potato, black lentils, vegetables** |

| | | | |
|---|---|---|---|
| Main livestock | Chauri*, yak, goat, local poultry | Goat, cattle, buffalo, sheep, local poultry | Goat, cattle, buffalo, sheep, Chauri, yak |
| Markets for agricultural products | Chilime, Saybrubesi,Dunche, Kathmandu | Chlime, Saybrubesi,Dunche | Chlime, Saybrubesi,Dunche |

*A cross between a male yak *(Bos grunniens)* and a cow *(Bos indicus)* is called a c*hauri* gai. Chauri is a hybrid female which produces more milk and is preferred. The male from this cross is called a *jopo (djo)* and the chauri is called a*djimo*. The *jopo*is not fertile. There are many variations of hybridization of yak and cattle, but the most popular is the chauri among the transhumance herders of Rasuwa.

**Vegetables grown commercially of later are cabbage, radish, carrot, cucumber, chili, tomato, cauliflower, onion, garlic and spinach.

(Source: Focus Group Discussions (FGDs), June 2017 in Upstream Rasuwa, HI-AWARE ICIMOD/SEARCH Nepal).

**Table 3:** Agriculture and Livestock.

## The Dominant Task Between Women and Men in Transhumance

The communities in upstream Rasuwa are generally a peasant society. They are, thus, dependent on agriculture and highland livestock raising including transhumance pastoralism to ensure subsistence livelihoods. The time and task activities for women and men are centered around the above two areas, However, in the recent past decade; service, intra-international labour, petty trade, trekking tourism, home-stay and services in hydro-power plants have supplemented their income, employment and livelihoods coping strategies [7].

The results of the FGDs illustrate that women carry out most of the task related to agricultural production at the Household (HH) level. In most cases, women carry out 5-8 major activities in agriculture compared to two or three for men. Furthermore, 3-4 activities are carried out by both women and men thus making women the overwhelming carriers of agricultural burden, clearly illustrating the feminization of agriculture. In terms of hours of work, women also provide more daily labour and drudgery over men in these hamlets. Rigorous quantitative time/Task Allocation Studies (TAS), elsewhere; demonstrate that women out-perform men by nearly 3.5 hours more than men on daily average bases on similar conditions and circumstances (The SOWN Study, 2015) (Revisiting the Status of Women in Nepal, SOWN, Shtrii Shakti, 2015).

Outmigration of able bodied young men and women between the age of 15-60 years from these hamlets more work burden on women. Thus women left in the HH bear the triple burden of productive, reproductive and social/civic work. Women also bear the burden of heavy physical work such as ploughing done traditional by men. The benefits are often shared in the family with women making substantial sacrifices for family welfare, nurturing and sustenance. The real incentives for women to work hard and carry the triple burden of productive, reproductive, social and civic responsibilities are to provide for family's livelihood needs and to nurture and care for children and elderly in the HH - in the hope that her family's quality of life improves in the subsequent generations to follow. In a patriarchal mountain community, women bear these extra work-burdens stoically, with aplomb, despite discriminations and sacrifices inherently involved in such unequal gender relationship. To be fair to men some do help with both social and economic share of the burden of the HH cost and expenditure through transhumance herding, laboring, working in service sector, and remittance economy. Yet the price is high on the HH and women as 50% of 'the rural enterprises' taken-up as coping endeavors fail (Socio-economic vulnerabilities due to Climate Change, ICIMOD/ HI-AWARE, 2016).

One finds women carrying out almost all activities in the agricultural production chain, i.e., seed selection, buying seeds, sowing, manuring, planting, weeding, harvesting and storing, except notably, marketing which is an economic/marketing activity. In comparison, men carry out heavier labour intensive ploughing and economically crucial buying, selling and market related activities. This marketing activity provides them more choices and opportunities in the HH economy and decision making functions over women. There are some exceptions as well; where in the case of cash-crop Chiraito (Swertiachirayita) growing women farmers from Tetangche, Chilime; men-folks and spouses are sharing the work burden equitably with women. Likewise, Ghale women from Goljung are demonstrating their ability to buy/sell and market their product in the absence of men. Similarly, the responsibilities for entrepreneurial women who are running small business, shops, and home-stay are challenging as they have to run the HH economy with "triple-burdens" as well as their micro-enterprises (Women in the household economy typically undertake and accomplish what is called the triple burden of productive, reproductive and the social roles).

Dalit women cope with their HH economy challenges through rearing small livestock, i.e., chicken, goats and cattle (HH equals household or households in short). Dalit men supplement their spouses' effort through making agricultural tools for barter or trade with the villagers. Women whose spouses are away as migrant workers carry out all agricultural activities. Similarly, women whose spouses are in the rangelands or kharkhas for 5-6 months in a year, face the added burden of running the HH economy, plus providing logistical support, nearly every fortnight or

monthly with ration of food, clothing and essential supplies for men and their animals – thus, severely stretching their ability to survive in an harsh environment (Sangjen Kharka (Rangeland/ meadows at over 4,500 m bordering Tibet and Rasuwa) reportedly has 200 Goth or nomads caravan settlement each with over 100 big and medium animals such as yak, chauri and sheep). Men, on the other hand, respond to the challenges of the HH economy for food security, income generation, employment and livelihoods by working as labourers, masons, builders, carpenters, porters, tourist guides, labourers/service providers in hydropower projects, petty services or migrate further afield to urban towns and international labour market in the Middle-East Gulf or SE Asian countries.

### Activity, Benefit and Incentive in Livestock Rearing

The results of the FGDs on the "Activity, Benefit and Incentive in Livestock Rearing"; together with "Activity, Benefit and Incentive in Agriculture"; reinforces the widely held belief and theory of the "inside-outside" dichotomy on gender roles within rural agrarian household economy. In this theory, women perform most of the task and drudgery inside the HH and the farm-economy. In contrast, it is the men who interact with the outside world. This is due to the fact that men are more mobile, better informed, more formally educated and more confident, able and adept in dealing with the "outside word" of markets and institutions away from home, hearth and the farmstead.

The women in most of the villages undertake fodder collection, feeding animals, cleaning sheds, managing and caring for the animals and birds, milking and providing traditional first-aid. In contrast, it is the men-folks who do the buying/selling and marketing of products from animals and birds. There are subtle differentiations as well - in livestock rearing/management and agricultural activities - among various socio-economic categories as noted in Table 4 and 5 above. In the case of micro-entrepreneur women's group, i.e., cash-crop growers, small business owners, home-stay managers; women cope by paying labor to supplement their livestock and agricultural work. However, due to substantial labour migrations from the villages, women have to pay for hired farm labour to perform their own household tasks related to livestock management and agricultural work. Shortages of farm labourers in the HH economy is also leading to breaking the "glass ceiling" on buying, selling and marketing of livestock products. This is because women have to come forward to undertake these activities in the absence of men especially with categories under migrant labourers and transhumance herders – who are away for extended period of time in a year.

What is also evident from the FGDs with women and men of upstream Rasuwa is that prized grasslands (rangeland) called kharka, i.e., Sanjen Kharka, between northern Rasuwa and Tibet - is contested and fought for grass-fodder for yak, chauri, sheep and goats - among the villagers. The change in climate and rise in temperature has had adverse effect on the transhumance pastoralist in terms of access, control and benefits from such rangelands. The group reported that there is less pasture land by area for all the 50 plus (Goths). More families are resorting to keeping (Goths) in the rangelands. Water sources are drying up and the quality of grasses are deteriorating due to less and infrequent rain and moisture. The rangelands are also becoming scarcer due to internal and international political control between Nepal and the Tibet Autonomous Region (TAR) (Historically customary laws governed the contagious areas of rangeland where pastoralist could graze their animals in the northern and southern meadows of Tibet and Nepal. In contemporary geopolitical scenario, administrative and political boundaries have changed and are more structured, thus depriving pastoralists from Nepal to take benefits from grasslands in Tibetan frontiers).

The younger generation and youth have benefited, to some extent, from the globalization, development of markets, employment opportunities, eco-tourism and more choices offered by life than their forebears. However, migration to towns and cities and less harsh life for livelihoods preferred by young couples and youth are also posing challenges to these hamlets. There are very few youths taking up transhumance herding as a rule in upstream Rasuwa.

## The Threat of Animal Diseases Such as Foot and Mouth On Yak and Ruminant Livestock

The main livestock population of Gatlang, Goljung, Chilime including other villages such as Thuman, Briddhim and *Syabru* are yak, chauri, buffalo, cow, ox, sheep and goats. The cattle populations are confined to villages in lower altitudes, whereas yak, chauri and sheep are grazed in higher mountain rangelands.

The analysis of the FGDs revealed that due to onset of climate change, temperatures are rising dramatically in higher mountains annually. Weather variability is affecting humidity, dryness and moisture in the air and surface environment. The practice of transhumance in these communities means that livestock are grazed in upstream and downstream environment during summer and winter depending on availability of grass and fodder. The prevalence of 'foot and mouth' disease in almost endemic and 'pandemic' proportion in sub-tropical conditions of Nepal has led to livestock population vulnerable to this disease.

### Foot-and-Mouth Disease or Hoof-and-Mouth Disease

*(Aphthae epizooticae)* is an infectious and sometimes fatal Viral Disease that affects cloven-hoofed animals, including domestic and wild bovids. The virus causes a high fever for approximately two to six days, followed by blisters inside the mouth and on the feet that may rupture and cause lameness (see Wikipedia). Furthermore, it has also led to dangers and vulnerability of

contracting 'hand, foot and mouth' disease for the human population in these highland villages and rangeland A review of foot and mouth disease in Nepal N.P. FERRIS [*], A.I. DONALDSON [*], R.M. SHRESTHA [**] and R.P. KITCHING. Hand, Foot, and Mouth Disease (HFMD) is a common infection caused by a group of viruses. It typically begins with a fever and feeling generally unwell. The viruses that cause HFMD are spread through close personal contact, through the air from coughing, and the feces of an infected person. Contaminated objects can also spread the disease. Coxsackievirus A16 is the most common cause and Enterovirus 71 is the second-most common cause.

The animal health extension in the upstream Rasuwa is nonexistent resulting in herders administering a number of local medications based on their culture and indigenous knowledge. One common remedy is to take the infected livestock to higher pastures above 2-3,000 meters. The other common oral recipe is to feed the animals with a mixture of protein rich diet such as eggs, honey and edible camphor including herbs and medicinal plants found in the meadows. The ill-effects of this disease are multifarious on both animals and human herders. The yak, chauri and ruminants produce less milk. The male species become impotent and cannot produce off-springs. The draft animal, especially, chauri cannot carry heavy burden of timber or local goods. In extreme cases they become ill and dormant and suffer fatalities. These ill-effects in turn causes the family members of herders to earn less from milk, meat and animal products. This causes them to become poorer and impoverished. Eventually, such a negative economic impact leads the transhumance herders to become indebted to village money lenders. In extreme cases they abandon their livestock transhumance trade and become 'environmental and economic' refugees in towns and cities. They eke out a miserable living and the family members suffer from debt, disease, insecurity and vulnerability from human traffickers and loan sharks in small towns or bigger cities.

## Customary Institutions and Governance System

The traditional customary governance systems based on the "council of elders" like in many Asiatic societies have been a strong local institution for governance in upstream Rasuwa. Locally it is called the Chogo system and each year up to two Chogos or headmen are chosen as leaders of the community. This is usually during the month of May or June each year when a ten days long festival of Mani Rimdu or mini-Losar is celebrated during the birth of Lord Buddha. Losar or Locchar, meaning the New Year, is usually celebrated during the full month of winter following the lunar calendar. It falls between January/February each year depending on the lunar cycle. The Tamangs celebrate the Sonam (common people) Losar which comes a month or a fortnight earlier than Gyalpo (nobility) Losar which at times coincides with the Chinese New Year. Mani Rimdu festival is celebrated as the mini Losar during the middle of the year. This is the occasion when a Chogo/Chogos are elected by consensus in hamlets of upstream Rasuwa. The Chogo system is particularly vibrant in Gatlang hamlet to this day [7].

The Chogos oversee a number of important functions such as natural resources management, conflict mediation, social and religious affairs, mediation of development works between communities and district authorities etc. The Chogo system, which is an informal governance system, is particularly strong and active in Gatlang village compared to Goljung or Chilime where the system exists only notionally. This customary system has been held in great respect by the local people of upstream Rasuwa. The system has substantial influence over the lives and ability of the people to cope with everyday existence from agriculture, livestock management, transhumance, and rangeland management, conflict mediation to social mores and religious norms and values of the communities in the three research sites.

The formal/statutory government system has recognized the importance of the Chogo system and has been budgeting for the remuneration of the Chogos in Gatlang since the last few years. Every individual has access to and benefit from this customary governance system including the minority Dalits in these three hamlets. However, it is a "patriarchal system" and the representation of women and her substantive participation in the position of the institution of the Chogo has remained minimal. It has always been a male domain. Despite this drawback, the benefits and position of women have been assured in this customary governance system. In the ever changing formal and unpredictable political system in Nepal, this informal system has substantial part to play and contribute to resilience against the vagaries of climate change and variability in the future. This is very relevant in a geographical location, i.e., highland meadows and rangeland, where formal government system of governance is yet to make its presence felt. The customary system is also inclusive and is close to the grassroots to consider the plights and aspirations of minorities such as women, Dalits, youth, children, girls and People Living with Disabilities (PLWD) and senior citizens.

### Transhumance Herders (Men Stay in Pasture Lands and Women Provide Logistic Support)

The women members of the transhumance herders manage their livelihood needs by intensely cultivating their small-plot farms with potatoes, corn, rajma-beans, black lentils, sesame seed and millet. They are also turning to cash crop farming with green leafy vegetables and tomatoes supplementing their income by keeping cattle, sheep, goats and chickens. Most of the responsibilities are shouldered by women of the HH. Men take yak, chauri, sheep and cattle and stay at least 6 months in pastureland in order to supplement HH income through herding, producing cheese and milk products. They sell milk to the cheese factory and also sell animals to the villagers.

Support and benefits from the non-state informal system, i.e. the Chogo system or the system of governance by the elders have been the traditional governance and institution in the three case study site hamlets. The community members have benefited from this system, which continues to this day, most actively in Gatlang. In this system, the two male Chogos dispense and govern the community land, rangeland, forest, water, and other natural resources. The Chogos also help in conflict mediation and preside over cultural and religious affairs and festivals of the community members. Women, men and Dalits have benefitted from this system equitably. The local government in recent years has been subsiding the remuneration of the Chogos, realigning its value and strategically harmonizing the loyalty of the local governance system in up-stream Rasuwa.

It is on note to mention here that the "kith and kin" system of informal family and clan support has been vital for the coping strategies in upstream Rasuwa. The Tamang people originated with 18 "golden clans" initially and currently have over100 sub-clans based on locations and geography (Dr. Mukta Singh Lama) Women and men (and women in particular who have little formal control over land or physical asset like house) rely on this system of "active mutual support" from close relatives and "clan network" to survive in a challenging and at times harsh "human condition" and environment in upstream Rasuwa. Access to finance and loans (A2F), in times of dire needs for the individual and families are also met through informal system of "money lenders". The "money lenders" are normally relatives who can trust other relatives and are provided loans based on the "promise" of payback. On the face value, it appears "usurious" as such informal and risky loans are as high as 100% interest rate within 2 years' time. Despite this stiff cost, and in the absence of alternative, women and men in need do take such "family loans" for investment, health care, education, building house or for expenses required during migration to third countries in search of jobs and better income.

Noting that the economic conditions in high mountain communities such as upper Rasuwa, is dire in the best of times and extremely harsh during unpredictable climate variability, the traditional governance and institutions have important role to play in order to ward of vulnerability. It is, therefore, prudent that the 'centre' represented by the newly introduced Federal Nepal governance system in Nepal from 2016

## Overall Adaptation and Sustainable Livelihoods Strategies

Human being like its wildlife counterparts tends to confront, hibernate or migrate to adapt to climate change stressors. The adaptation or confrontation to climate change in up-land Rasuwa has been to intensify agricultural cropping patterns and to move towards cash crop cultivation. At the same time livestock management and transhumance herding have been intensified as well. The gathering of Non-Timber Forest Products (NTFPs), farming of rainbow trout fish, trekking tourism, home-stays, setting up restaurants, shops, small business and trade have been intensified. Furthermore, in order to supplement HH income, each of the family has sent at least one member to towns, cities or third countries to earn extra income and supplement the HH economy in order to ensure sustainable livelihoods.

## The Institutional mechanism of the Traditional Customary Headman system

In the transhumance pastureland management, the Chogo is "mandated" to oversee the local rangelands. He is, therefore, effectively in-charge of the communal pasture-land in highland land meadows called kharkas. The accountability of the Chogosis ensured through a council of elders much like the Loya Jirga in northern Pakistan and Afghanistan. Each village or conglomeration of hamlets chooses it representative called the "Ditta". The Dittas are "mandated" by the council of elders to oversee the leadership and management role of the Chogos.

The traditional Tamang "customary law" is based on traditional rules of the game or the code of conduct (CoC) called the rimtim or cultural propriety of the community. The rimtim is strong and most of the community members adhere and follow the CoC or face its consequences such as the risk of "ostracization" and isolation by the community and clan members. The position of the elders in the society including ancestors and parents are also respected by the community members. The Goompa and the Lama play an important role. Besides these traditional institutions there are two "manijatras"; similar to a one day long "maniRimdu" or prayer sessions during Buddha Jayanti around mid-May. This is during the fortnight long reading of the sacred text or *sutras* called "domang" or "kangur" recitation sessions. After such ceremonies, the wild spirit or ghost "mahmo" is warded-off from the villages and the community members – much like stoning of the devil in Mecca. These traditional religious and spiritual celebrations are followed by more utilitarian secular business such as administration of the village and community life including common property and natural resources management.

In similar vein, when it comes to agro-forestry and agricultural cultivation practices, the governance system is defined and determined by the traditional customary law. This is normally defined by the hierarchy based 'religious order" such as existing Lamas in olden times. In the current contemporary times, the Lama themselves do not come forward as "Ditthas" but select or nominate their "proxy" to become the "Ditthas".

The Ditthas are constituted out of the local religious orders, civic society members and members of the political parties. They become like the "constitutional councils" in order to have

oversight of the Chogos and ensure community accountability. In terms of the natural resources management, Chogos carry out the supervisory function. They are closely and informally guided and "monitored" by the Ditthas. A person wishing to make use of the rangeland - which is usually in small manageable areas like 30-50 chauriload of grasses for each individual family - approaches the Chogos and the Ditthas with financial and material offers in an informal auction or bid process. In traditional terms, these bids are called the "pong" and "salgar". The process of approaching the traditional customary authority is called the "pong" and the material or financial offer the "salgar". Once there is an agreement between the Chogos and the concerned person then s/he can harvest the natural resources such as grasses, fuel or timber according to volume for a year or one season and/or graze the yak, chauri and sheep. The natural resources can be also timber and fuel-wood harvest.

Remuneration of the Chogos was conventionally paid "in-kind" or in "cash" by having specific amount of grains, butter or ghee allocated to a Chogo. Currently, in order to compensate the Chogos efforts, a monthly remuneration of NRs. 6,000 per month is allocated by the Local Government or formerly the VDCs. Reportedly, according to the transhumance herders there were about 50 Goths in Sanghen Kharka in 2017. Livestock such as chauri and yak, goats and local poultry are also very important sources of food and income for households in Gatlang VDC. Chauri is the most important livestock for this high-altitude area because of its resilience to severe cold and fodder stress. Households have constructed 50 small shelters for chauri and yak herds in the high-altitude areas of the VDC, where at least 50 male members of households stay to take care of livestock. They bring chauri/yaks to the nearby Sangen pasture for grazing. (Sangen is a big pasture-land that extends to Tibet and is shared by Gatlang, Goljung and Grey settlements inter alia*)*. This is one reason why female members must carry out agricultural work in the absence of male members. During the winter months, snow covers the pasture lands, and households use dried crop residues as fodder for livestock. Chauri are a good source of income for households (See below Income from Sale of Chauri Milk in Gatlang) Interviews with Key Information Persons (KIP) Mr. Jeevan Lama Syangten, Gatlang, Rasuwa and his father Mr. KesangWangdi Tamang including transhumance herders of SangenKharka, Dandagoan, Thulogoan, and Sharamthali rangelands.

### Income from Sale of Chauri Milk in Gatlang

The Dairy Development Corporation (DDC) of Nepal established a cheese factory in Gatlang in 1977 (2600m above mean sea level). This factory is still operating and providing a good income opportunity to local livestock farmers. The factory produces 9000-11000 kg of cheese and 3000 kg of butter per annum. This requires the supply of nearly 90,000 liters of milk per annum from Gatlang livestock farmers. Farmers are not only meeting this milk demand but also save sufficient milk for family consumption. The price of milk is determined by the factory based on the fat contents in the milk. On average, Rs. 54/liter (US$ 0.51) is being paid to milk suppliers. Overall, 40 chauri farmers supply 246.6 litres of milk per day to the factory, and per household annual gross income from milk sale is nearly Rs 121,500 (US$ 1,146). It implies that the 40 chauri farmers earn nearly Rs 10,000 (US$ 94) per month from the sale of chauri milk. Distributions of gross milk income across all 400 households reveal an average income of nearly Rs 12,000 (US$ 113) per annum [8].

## Conclusion

The onset of climate change and weather variability has introduced elements of uncertainty, change and diversification in the coping strategies and ability of the communities in highland mountain communities such as in upstream Rasuwa. In comparison to a few decades ago, occupational tasks have diversified from agriculture and livestock management to services, providing assistance to eco-tourism; working in trekking tourism as guides and porters; running home-stays and lodges, collecting and selling NTFPs (non-timber forest products) to working in development projects such as roads and hydropower plant construction and maintenance. In the past decades, there has been marked increase in international and international labour migration in order to support income for household expenses.

As these diversifications in time, task, risks and occupations take place; one also sees that communities have become more vulnerable to the vagaries of climate change including globalization, penetration of commodities from third countries and impoverishment of the highland community members. The formal governmental institutions and banks are yet to make an impact in these remote areas. In their absence, it is the "informal system" of clans, kins and close family members that provide support to one another in times of needs and wants.

Interestingly, family members are also intensifying their traditional agricultural practices from cereal crops to cash crops such as vegetables, NTFPs, potatoes and modern tunnel farming, drip irrigation to farming in-land fish such as rainbow trout. At the same time, the family members are also intensifying their income from transhumance herding of yak, chauri, sheep and cattle in the pasture land. Since, the institutions of the government and its extension in agriculture and livestock is weak – it is the informal customary governance systems and institutions such as the Chogo system – which has continued to fill the much needed void and provide succor to the local communities and families of transhumance herders. This applies in combating animal health challenges like the 'foot and mouth disease' in their animal population [9].

Noting this reality and acknowledging it effectiveness, even

the local government is gradually remunerating the local headmen called Chogos with monthly remuneration. Since, such governance and institutions are anchored on the strong foundation of "emotional intelligence", empathy, camaraderie and common property stewardship of local resources including rangeland or Kharka management; it would be mutually beneficial for the traditional transhumance herders, its family members and the country, to derive benefit from policies enacted to ensure their good governance and mutual benefit. At the same time, it would be mutually beneficial to ensure strengthening where feasible the traditional customary laws and systems for community members such as the transhumance herders to help themselves through livelihood efforts and market linkages as in the case of yak and chauri milk production for cheese and butter and its effective market linkages including selling of animals for meat and utilitarian tasks like carrying heavy load as 'draft animals'.

There are also a few important policy implications for the government of Nepal. The government has consistently emphasized through its annual budget and periodic plan that it aims to provide prosperity to its people. Nepal being a diverse country with over 101 ethnic groups and 150 languages, the government agencies, policies, programmers and budget outlay must ensure gender equality and socially inclusive provisions for upper Rasuwa. This is because as noted in the above findings the marginal, indigent and backward community of Tamang, Ghale and Dalits are the poorest among its population milieu. In this manner, social, economic and development justice can be insured to the people of upper Rasuwa.

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