

# The Fate of Traditional Rangeland Management Practices under Bhutan's Changing Policies and Socio-economic Conditions

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## ABSTRACT

Bhutan Land Act of 2007 is the latest policy change, which will have huge impacts on nationwide traditional rangeland management practices. It was approved in 2007 and will be implemented by 2017, keeping a grace period of 10 years for preparation to the change. Rangeland users across the country might have to adapt to a new system once the act is implemented. In the process of adaptation to the change they might become vulnerable to socio-economic and environmental changes. The expected impacts of the policy change and other drivers of change like socio-economic factors on traditional rangeland management systems of yak herding communities of Toorsa Strict Nature Reserve were investigated in this study. The household survey was conducted in three yak herding gewogs of Haa, while key interview and focus group discussions were conducted with the herders and the livestock extension officers from the same gewogs. It was found that implementation of the latest policy would breakdown the customary rangeland management practices and traditional institutions. The change is also likely to trigger heaving grazing pressure in temperate zones while grazing pressure in the alpine zones might get reduced. These changing dynamics will alter the ecosystem composition and functioning of high-altitude rangelands thereby threatening the livelihood of the yak herders by making them more vulnerable to environmental and economic changes.

**Keywords:** yak, rangeland, grazing, alpine, temperate

## Introduction

Rangeland covering nearly 33 percent of ice-free land globally (Ellis, 2008) provides both tangible and intangible ecosystem goods and services (Millennium Ecosystem Assessment, 2005; Havstad et al., 2007) supporting tens of millions of people (Papanastasis, 2009). Rangelands are generally defined as the type of land suitable for grazing by wild or domesticated animals and generally maintained as a quasi-natural ecosystem (USDA-NRCS, 1997). The rangeland ecosystem is the largest land use type in the Hindu Kush Himalayan (HKH) region, covering over 60 percent of total land area (Zhaoli, 2009). Rangelands in the region are the source of livelihood for 25 to 30 million pastoralists and agro-pastoralists. They also provide critical ecosystem services to 1.3 billion people living downstream (Miller, 1996; Shaoliang and Sharma, 2009). The rangelands in the HKH region are also suitable habitat for many endemic flora and fauna (Miller, 1996; Shaoliang et al., 2007; Brandt et al., 2013). Rangelands in the HKH mountain regions have also increasingly become popular tourist destinations (Miller, 1996). Rangelands in Bhutan are undergoing considerable change and the general believe is that the quality of rangeland is deteriorating. However, there are only few scattered literature on change in pastoral lifestyle (Ura, 1993; Ura, 2002) and its impacts on rangelands (Gyamtscho, 1996; Roder, 2002; Moktan et al., 2008; Wangchuk, 2010).

Rapid globalization and various factors like change in national policies, technological change and economic change seem to be altering the original range of variability within which socio-ecological systems function. This change often raises new challenges leading to degradation and marginalization of arid rangelands (Janssen et al., 2007; Whitfield and Reed, 2012). For example in China, there is a growing trend to promote agriculture and livestock production among pastoral communities mainly through changes in rangeland management systems (Miller, 1996; Ning and Richard, 1999). The current global trend of pursuing efficiency and fairness through establishing market-oriented land property systems based on private

ownership of the land (Sjaastad and Cousins, 2009; Ybarra, 2009) is changing customary land use practices worldwide.

Similarly in Bhutan, since the enactment of the 1969 Bhutan Forest Act there has been a series of policy changes affecting rangeland resources utilization (Ura, 1993; Chopheyel, 2009). The core idea of this series of forest, livestock and pasture policies was to improve livestock productivity by promoting sedentary lifestyle of the migrating herders (Ura, 1993). However the enactment of various policies related to rangeland and livestock were always done based on the assumption that rangeland quality is deteriorating as reported by Ura (1993).

As per the most recent Land act 2007, all communally and privately owned rangelands in the country will be nationalized and leased back to the different users under private ownership. One of the main driving forces for this new policy is to ensure equitable distribution of rangeland resources. Under the new act irrespective of possession of livestock and their herd size all yak herders will receive their share of grazing land and they will be allowed to rent out their share of grazing land.

The central government is yet to implement the new policy although it was approved by parliament in 2007. The delay is due to the 10 years grace period given for implementing this new policy. As per the new land act, there will be 10 years of grace period where Royal Government of Bhutan will be developing mechanisms of distribution, paying compensation to privately owned rangeland and developing a rangeland management manual which will guide the users to sustainably manage their rangeland. Till then it depends on the users whether they want to adopt the new law or continue business as usual.

However, according to recent media reports, herders in Merak and Sakteng in Eastern Bhutan are already requesting the government to reconsider the latest policy, Land Act 2007 (Wangdi, 2014). For some places like Paro, where herders have been using rangelands belonging to monasteries (Ura, 1993) by paying rent, might welcome this new policy, but other herders across the country might have to adapt to a completely new system once the act is implemented. In the process of adaptation to the change they might become vulnerable to socio-economic and environmental shocks. Whether the change might increase or decrease the degree of exposure of herders to socio-economic variability and whether the change is going to improve the perceived degrading quality of rangelands is yet to be ascertained.

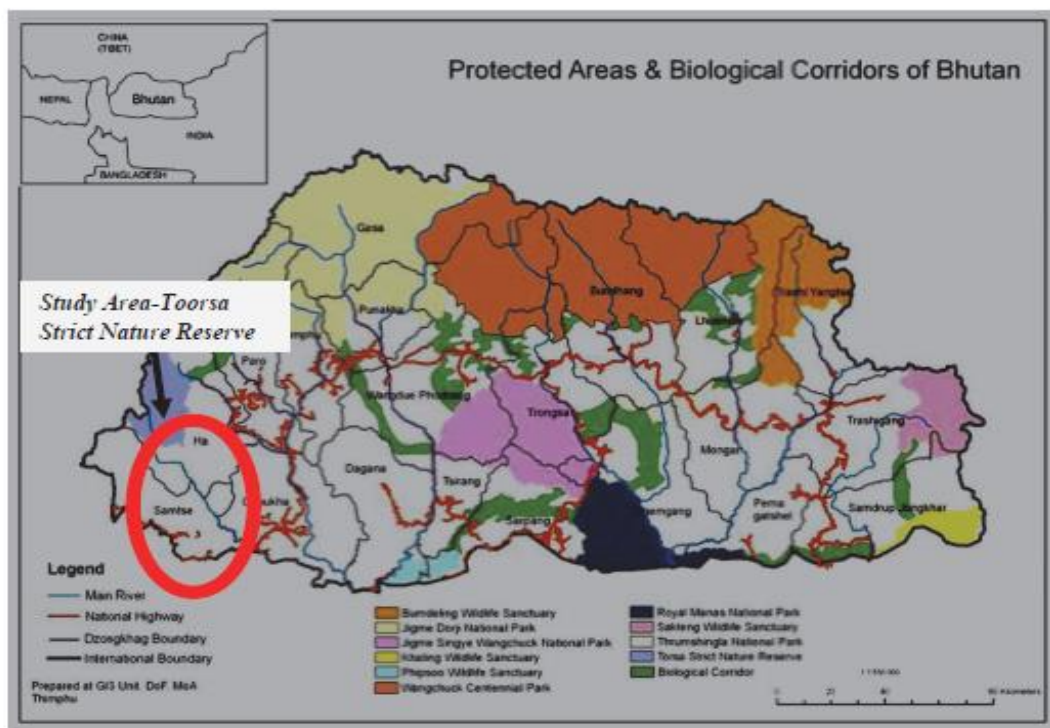
Currently apart from two reports by government agencies (Chopheyel, 2009; Gyeltshen et al., 2010) no studies have investigated the change in customary rangeland management systems under changing policies and socio-economic conditions. Any decision based on the limited information regarding the overall dynamics of change in rangeland management systems might further marginalize the yak herders. The need for understanding rangeland user dynamics is also reflected in the management plan of the current study area, Toorsa Strict Nature Reserve (TSNR), where conservation agencies are looking for ways to integrate interest of rangeland users into their management plans (WCD, 2011). This study aims to fill this knowledge gap by investigating the expected impacts of change in national rangeland policies and socio-economic factors on traditional rangeland management systems in TSNR.

### Study area

In Bhutan the word *tsamdrog* is used to refer to rangelands, which generally fall within the altitudinal range of 400 to 5000 metres above sea level (masl) (Gyaltsen, 1996; Gyeltshen et al., 2010). A total area of 406,523 ha has been registered as *tsamdrogin* Bhutan (MoA, 2007). The high altitude rangeland stretches from North of Haa in the west to northeast of Trashigang, dispersed over the entire northern region of Bhutan and amounting to 3.9 percent of total land cover in the country (Chopheyel, 2009). Rangeland is used by migratory herds of yaks and other livestock depending on their location (Roder, 2002). The rangeland ecosystem is the main source of livelihood for yak herders (Chopheyel, 2009) who constitute 1.3 percent of 84,474 total rural households in Bhutan (RGOB, 2012).



TSNR is the only strict nature reserve in Bhutan falling under IUCN category Ia, with total area of 60950 ha. The reserve is located between 27° 34' and 27°11' latitude and 88° 54' and 89° 10' longitude in western Bhutan, bordering the Indian state of Sikkim to its west and Tibetan Autonomous region of China to the north. Altitude of the area ranges from 1400 m to over 5000 m above sea level (WCD, 2011).



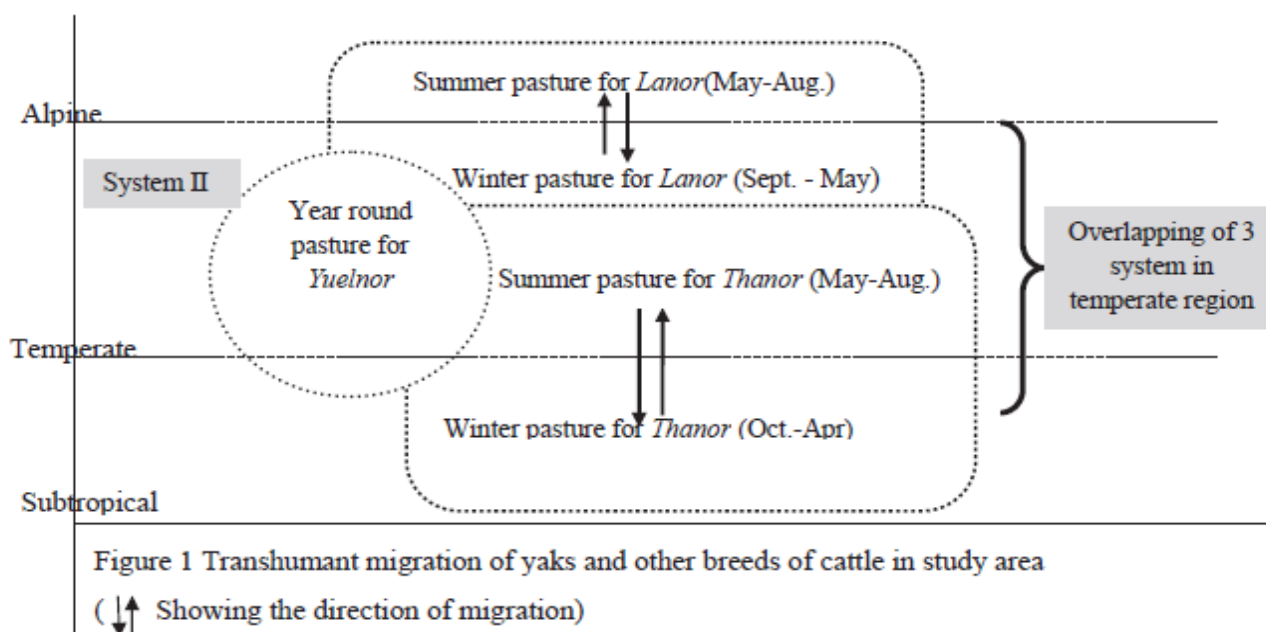
Map 1 showing the study area – Toorsa Strict Nature Reserve (Adapted from Department of Forest and Park Services, RGOB)

The reserve has the most pristine temperate forest and alpine vegetation in Bhutan and arguably in the Himalayas. It is the habitat for endemic plant species like *Viola bhutanica*, *Bhutanthera himalayana*, *Meconopsis superba* and *Bryocarpum himalaicum*. Other flagship species like Red Panda and Snow leopard have also been recorded (WCD, 2011). The reserve is also the catchment of Amochu and Wangchu rivers in Bhutan, which feed hydropower plants downstream (Wangchuk, 2011). Given the rich biodiversity it was designated as part of the Sacred Himalayan Landscape linking the three major trans-boundary conservation areas in China, India and Bhutan (WCD, 2011).

According to the TSNR management plan, the pastoral community living around the reserve rear three distinct types of large ruminants in three production systems, namely; *lanor* (transhumant yak system in alpine and temperate region), *thanor* (migratory cattle in temperate and subtropical regions) and *yuelnor* (sedentary livestock rearing system in rural and semi-urban settlements) as shown in Figure 1. Yaks usually graze inside TSNR while thanor graze inside TSNR during summer months only. *Yuelnor* graze year round in the buffer zones of the nature reserve (WCD, 2011). Yak husbandry forms an integral part of the pastoral system in TSNR, for example the average annual income from dairy products in 2012 ranged from Nu.10506 (US \$ 175) to Nu. 23,938 (US\$ 400; 1 US\$=60 Nu.) (ADB, 2013).

A preliminary reconnaissance study found that during summer months the yaks generally graze in alpine zones and in winter they migrate down to temperate zones. While

other migratory cattle herds consisting mainly of local breeds they migrate between summer pastures in temperate and winter pastures in sub-tropical regions as depicted in Figure 1.



### Traditional resource use mechanism

*Northue* (joint-cattle ownership) is a unique livestock rearing system practiced between Sama and other higher altitude gewogs (sub-district) of Haa dzongkhag (district) which falls in the buffer zone of TSNR. During summer livestock is owned by the upper three gewogs and graze in temperate region while in winter the partner in sub-tropical region of Sama gewog takes over the ownership.

Rangeland resource utilization in TSNR is guided by well-defined and mutually agreed upon rights and rules backed by various social controls and sanctions (Ura, 1993; WCD, 2011). Committee members consisting of one representative from each household with yaks or other migratory herds of cattle divide the total area of rangeland among an equal number of herders, according to their customary rules. Then each herder throws the dice and whoever gets the highest number will be the first one to choose the pasture of their choice. In Katsho gewog redistribution of rangeland is held every three years while it is held every five years in Eusu and Bji gewogs. This old age traditional system is now under transformation and greater changes are expected due to implementation of the new rangeland policy.

### Methods

A review of rangeland policies in Bhutan since 1969 was conducted using the policy analysis framework described by Bellamy et al., (1999). Impacts of the implemented policy on rangeland management systems were then identified through a review of the relevant policy documents and government reports.

An extensive household survey was conducted from June to July 2013 to assess the reality from the perspective of the yak herders. The target population was selected from three gewogs of Haa dzongkhag, which fall under TSNR. Convenient sampling technique (Marshall, 1996) was used where we tried to interview as many households as possible from all the three gewogs. Almost 50 percent of yak rearing households in Bji and Katsho gewogs were surveyed. In the case of Eusu gewog there were only five herders, so all of them were interviewed. Altogether, 56 percent of the yak herding households (N=25) were surveyed.



using structured questionnaires. The survey questions were adapted from the rangeland and indigenous cattle management studies conducted in high altitude areas of Northern Nepal by Dong et al., (2007). Questions focused on land tenure changes, customary institutions, traditional rangeland management practices, improved pasture development and constraints to yak rearing. Secondary data on yak population and the number of yak rearing households from national livestock data were analyzed and compared to further support the findings from the survey. The yak population in the study area was also compared to the earliest yak population reported Ura (1993). The results of the household survey were analyzed using simple descriptive statistics with Microsoft excel tools.

Further, interviews with key informants and focus group discussions were carried out using the participatory rural appraisal (PRA) framework described by Jorgensen (2008) to gain deeper insights into the topics raised in the household survey. Finally, through participatory observation, burning of the shrubs in rangeland and the conditions of fencing to control grazing were recorded in field notes, as suggested by Olsson and Folke (2001).

## Results

### Drivers of change in rangeland management

#### Change in land tenure

**Pre-1960s:** For generations yak herders in TSNR followed their customary communal tenure and management of rangeland. During the early 1960s, the Royal Government of Bhutan systematized a new grazing land tax and every herder was required to officially register their grazing land with approximate size and area. Grazing lands were registered in the name of private individuals, community, monastic institutions and others. Under the new law the owners were required to pay annual tax irrespective of herd size or extent of the pasture. However, there was no major change in access to rangeland resources except that after registration the owners had to pay tax.

**During the 1970s:** With the enactment of the 1979 Land Act and the 1969 Forest Act, there was a major shift in actual ownership of the rangeland. According to these acts land ownership was changed and registered as government land while owners were given the user rights. Herders were allowed use rangelands located within and beyond their district boundaries. They also had legal rights to protect against trespassing and encroachment into their grazing lands. However, the customary practice of leasing part of the grazing land and collecting rent was ruled out.

**Current situation:** The most recent policy change was the enactment of the 2007 Land Act which will be implemented by 2017, where the existing rangeland will be nationalized and will be leased back to the pastoralists for not more than 30 years. One of the major changes according to the new act is that the users can only become a lessee within their district. In TSNR currently more than half of the yak herders graze in community rangeland owned by communities of Bji, Eusu and Katsho gewog. Some of their grazing sites also fall under Paro district. Herders also reported that they graze in government land and few households also have rights to their private rangeland, which they do not have to share with the other herders. However, by 2017 when the 2007 Land Act gets implemented, all the rangelands in TSNR will be under private ownership contrary to current scenario shown in figure 2.

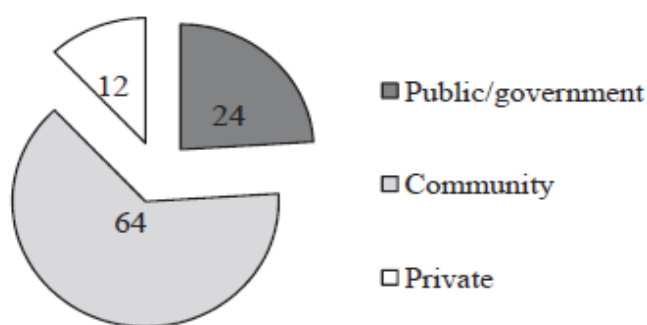


Figure 2 Land ownership of yak grazing sites shown in percentage

As per the latest policy, the state will also assist users in developing improved pastures and encourage farmers to rear improved breeds for cattle aiming to increase the productivity. However the capacity of the herders to cope with the change was discussed in the subsequent pages.

#### Reduction in incidences of burning

Practice of indiscriminate burning of alpine pastures during dry winter season has always been in conflict with national forest policies of Bhutan since the first one was enacted in 1969. According to 25 percent of the respondents, burning is the only known remedy for improving the pasture quality. Although Royal edict was issued in 1981 allowing yak herders to use burning to manage rangeland in alpine regions under supervision of technical persons from forestry department, all of the respondents were of the opinion that using fire for rangeland management was illegal. However, this has not stopped them from using burning as a practice. Remains of recent burning were frequently observed during the field visit.

However respondents of focus groups discussion agreed that herders always start fires with the fear of being apprehended, due to which the total area burned by individual herders is less than what they used to practice in the past. Respondents also cited other reasons like having abundant summer fodder in their alpine regions in recent years has reduced burning pasture in winter.

#### Reduction in number of yak rearing households and reduced yak and sheep population

Changing socio-economic priority of the households has directly resulted in reduction of the number of households rearing yaks and also reduction in yak population over the past decades. Total yak rearing households has drastically declined, from 161 households in 1990 to 35 in 2013 (Figure 3). Currently on an average each households owns 56, 61 and 76 yaks in Bji, Eusu and Katsho gewogs respectively.

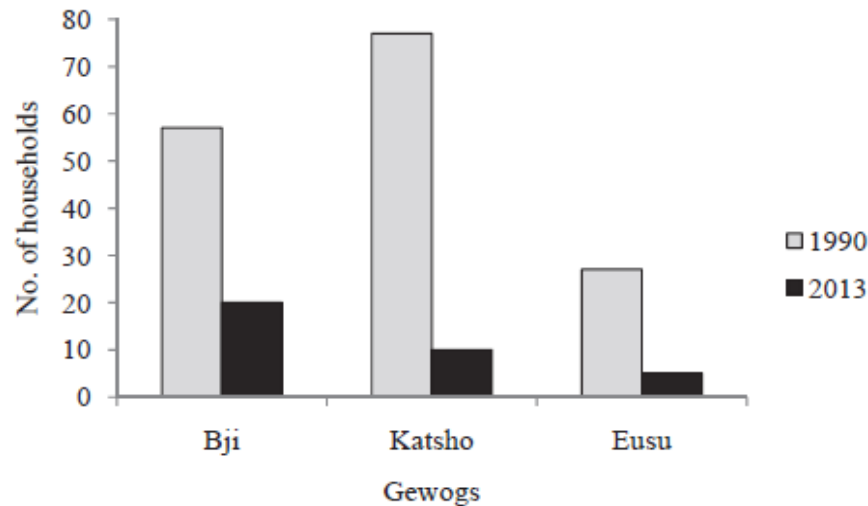


Figure 3 Number of households rearing yaks (The earliest report on yak population in the study area was by Ura (1993))

Over the past two decades, the yak population has been decreasing (figure 4). Households giving up yak herding have either sold their yaks or they have leased their yaks to the remaining herders. During the focus group discussions, the participants agreed that reduction in number of households rearing yaks and reduced yak population has reduced overall grazing pressure on rangelands in alpine zones where yaks graze in summer. They also reported that grazing by huge herds of sheep owned by sheepherders from Samtse dzongkhag has completely stopped over the last decades. This has reduced competition on their yak grazing sites in alpine pastures during the summer. Herders speculate that nowadays readily available and cheap imported garment might have made rearing sheep for wool less profitable. According to the focus group discussants alternative income earning opportunities must have also lead to interruption of sheep rearing.

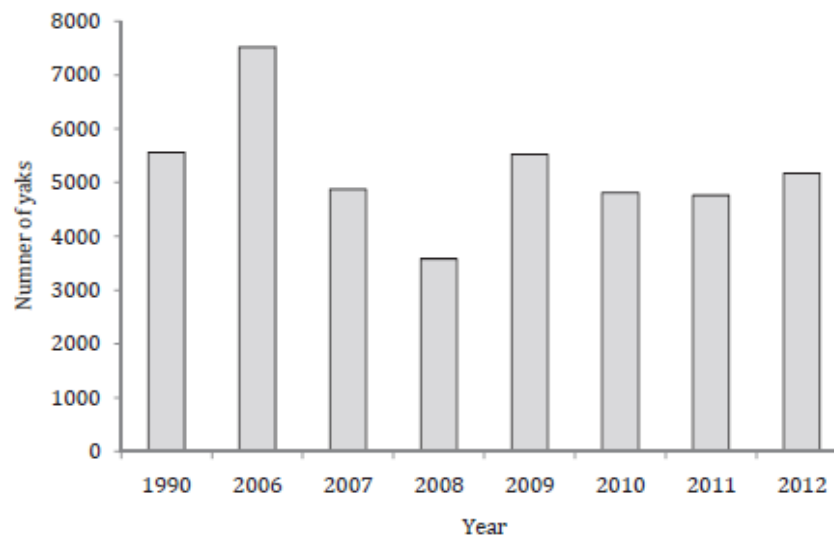


Figure 4 Trend of Yak population (The earliest yak population of the study area was reported in 1990 by Ura (2013). It was presented here to provide an overview of population trends over the decades)



### **Farm labour shortage**

Yak herders nowadays prefer their children venturing into other economic activities, which offer better income earning opportunities with less hardship than rearing yaks. This has caused farm labour shortage. More than half of the survey respondents have cited household labour shortage as main reason for the decline in number of households rearing yaks. While other reasons for quitting yak rearing was also due to lack of government support and better income earning opportunities besides yak herding. Those herders who gave up yak herding opted for small scale agriculture activities, off-farm wage labour and settled for sedentary lifestyle rearing livestock of improved breeds and local breeds.

### **Impacts of the change on traditional rangeland management**

#### **Interruption of transhumant migration**

According to the latest policy, leasees will be eligible for grazing land within their district only. In case of yak herders of Haa, movement of yak herders will be allowed within Haa dzongkhag only. Currently the yak herders use some grazing sites of both summer and winter pasture falling under Paro dzongkhag. Further the movement of other migratory herds from Haa into other districts like Samtse and Chukha dzongkhag will also be stopped. This will increase the pressure on grazing sites in temperate zones. It was noted during the survey that 70 percent of the yak herders complained about scarce fodder resources during winter months in the temperate zones. Limiting movement of the animals into other districts will further exacerbate the situation in winter grazing sites in temperate zones.

#### **Complete breakdown of the customary institutions**

When respondents were asked whether they were satisfied with customary institutions, 84 percent of the respondents said 'yes'. The new policies will completely breakdown local customary rangeland management and resource sharing mechanisms. It will be a complete shift from customary communal management model to household tenure and household management model. The communal ownership of the rangelands under TSNR will be changed into private ownership.

Currently the herders still practice their customary rules and regulations. However, there are already reported incidences where herders get into conflicts over grazing rights. For instance, in the recent years yak herders from Haa has to face strong competition in their winter grazing sites by cattle from Paro dzongkhag. Since the grazing sites fall under Paro dzongkhag most of the cattle owners from Paro are anticipating the new policy approved by parliament in 2007. During the focus group discussions, participants unanimously agreed that different levels of awareness of the new policy were the main cause of the conflicts. Moreover no clear-cut directions during the intermediately stage between enacting the new rangeland policy (Land Act, 2007) and implementation have caused confusion among different user groups. The conflict resolution mechanisms under the customary institutions also seem to be ineffective under such circumstances.

#### **Customary practices of controlling grazing pressure are losing its significance**

The reduction in yak population and reduced number of households rearing yaks in the past decade was found to degenerate the significance of traditional practices of controlling grazing pressure. For example all the herders of Eusu gewog were required to gather around Tshotshokha (N 27° 22.49' E 89° 12.62') and graze their yaks together at the same place for almost three months in a year. It was done to reduce grazing pressure on other sites. According to the elderly herders this was also an important social event for the yak herders. This practice has completely stopped over the last decade.

In the past herders also put fencing at strategic locations between two grazing sites in



order to control grazing pressure. Fencing is generally built of stone walls and wooden structure. Traditionally such blockages have to be well maintained to control indiscriminate grazing. However, most of the blockages observed during the field visit were be poorly maintained. The herders also agree that they do not maintain this blockage fencing in the alpine pasture due to abundant fodder resources in summer pastures.

### Increasing localized pressure on rangelands

Farm labour shortage has affected grazing dynamics in winter grazing sites for yaks in the temperate region. Discussants during focus group discussions agree that the sedentary breeds of cattle seldom grazed remote pastures. They believe low grazing pressure has resulted in shrub encroachment into the grasslands. However, the situation is completely opposite in the pastures near the villages. Year round grazing by sedentary breeds of cattle and winter grazing by yaks has resulted in heavy grazing pressure in the grasslands nearby villages like in grazing sites near Damthang and Womjee.

Heavy grazing pressure and shrub encroachment in temperate region reduces fodder availability for the yaks in winter. The participants also report loss of young and weak animals during winter months mainly due to fodder scarcity. According to some elderly herders during key informant's interview, limited fodder resources in winter months is the bottleneck to take advantage of abundant fodder resources in summer pasture. Increasing localized pressure might also result in habitat fragmentation.

As shown in table 1 only few households were found to using supplementary feeds like turnip, radish and mustard oil cakes during winter months. However, labour shortage, crop raiding by wild animals and limited technical support from government limits herder's interest in growing supplementary feeds, as reported during focus group discussions. Other reasons like limited milk production in winter, makes less priority to feed the animals unless they are very weak or under extreme climatic conditions like snowing.

**Table 1 Status of growing winter supplementary feeds**

Survey questions	Percentage of Respondents	
	Yes	No
Do you supplement livestock with additional feeds in winter?	37	62
Do you grow improved fodder to feed livestock in winter?	40	60
Do you harvest and preserve your surplus feeds for winter months?	12	33

### Change in vegetation composition

Reduction in fire incidences will trigger change in vegetation composition, which over the long run might completely change the ecosystem. According to Ura (1993), most rangelands in eastern Bhutan are always maintained by burning during dry seasons. However restriction might completely change the vegetation composition.

### Threatens indigenous ecological knowledge

Elder herders during key interview sessions expressed their concern in losing basic indigenous ecological knowledge. For instance previously herders assess the productivity of pasture based on abundance of species like *Potentilla coriandrifolia* and *Chesneyanubigena*, which they believe to possess higher nutrition values. Herders used to prefer pastures with high abundance of these plant species that grows at higher altitude.

## Discussion

Loss of significance of traditional rangeland management practices were also reported from other pastoral communities like Merak and Sakten (Chophyel, 2009) and in Ura where herders were also reported to have realigned their migration routes parallel to roads and quickening the return from remote pastures (Ura, 2002). Breaking down the customary practices and local institutions under changing rangeland policies is similar to changes which occurred under China's grassland contracting policy. Under this policy in China, for short term it has increased the livestock productivity. However, over the long run it has made the herders more vulnerable to extreme climate and economic shocks. Similar change in land tenure has reduced the adaptive capacity of the herders of Alxa Left Banner in Inner Mongolia (Zhang et al., 2013).

Reforming rangeland policy by privatizing has reported to be negatively affecting the livelihoods of the herders mainly due to elimination of their traditional coping strategies with non-equilibrium conditions (Jun Li et al., 2007; Li W, 2011; Zhang et al., 2013). Pastoralists' traditional knowledge of exploring heterogeneity of resources through migration of herds and rearing diverse livestock were some of the adaptive strategies under extreme climate events like drought (Zhang et al., 2013).

However, when herder's mobility was restricted, it was found to be negatively impacting the relationships among the herders and between herders and other stakeholders. The impact of reduced mobility on economic situation was visible in terms of reduced household saving of the herders under restricted mobility (Zhang et al., 2013). Restriction of mobility of people and animals has also been found to result in habitat fragmentation (Hobbs et al., 2008). Hobbs (2008) also argued that spatial isolation of grazing ecosystems limits the ability of people and animals to exploit heterogeneity in vegetation. Access to heterogeneous vegetation through means of transhumant migration provides critical options in case of arid and semi-arid ecosystems to sustain human economies and ecological processes (Hobbs et al., 2008).

The problem of intense grazing on one site and creating localized grazing pressure was also reported in rangelands of Western Sichuan province (Ning and Richard, 1999) and Yunnan (Shaoliang et al., 2007) of China, where winter pasture areas are overgrazed while remote summer pastures tend to be destocked. Increased grazing pressure during growing season in winter grazing sites leads to scarce fodder resources during winter months. This was found to be the bottleneck in increasing the livestock population to take advantage of abundant resources in summer grazing sites (Ning and Richard, 1999; Shaoliang et al., 2007). A similar pattern seems to be developing in the rangelands of TSNR. Investigating the impacts of grassland contracting policy in Inner Mongolia has also found similar cases where restriction of herder's mobility has increased localized pressure on rangelands. Often overgrazing due to increased localized pressure can lead to other environmental issues like soil erosion and habitat fragmentation (Li W, 2011).

It is very hard to predict the impacts of burning or stoppage of burning on the rangelands in Bhutan with limited empirical evidences. Huge variation in vegetation and fire environment often makes it difficult to generalize response of vegetation to fire (Guevara et al., 1999)b. According to Roques et al., (2001) burning cessation has triggered shrub encroachment in South African Savannas. Sherman (2008) also reports similar findings in north western Yunnan, China.

On the other hand there are mixed results of reaction between burning and shrub growth. For instance, dendrochronological analysis by Brandt et al., (2013) suggested that the region wide burning ban in 1988 may have fostered initial establishment of dwarf rhododendrons that then spread rapidly in alpine meadows in the southern Himalayas. However burning does not appear to have driven patterns of shrub encroachment (Brandt et al., 2013). Other studies also reports that once the grassland changes into shrub land, shrub cover increases regardless of fire frequency, and some shrub species actually spread faster with burning (Briggs et al.,



2005), likely due to fundamental changes in ecosystem structure and function (Bond and Keeley, 2005).

Similar to our findings, the farm labour shortage was identified as the main cause of decline in yak rearing trend in Bumthang and Wangdi dzongkhags in Bhutan (Gurung, 2012). Decreasing yak rearing trend was also recorded in Merak and Sakten in Eastern Bhutan (Wangchuk et al., 2013) due to labour shortage. Besides massive impact on ecosystem compositions, according to Farooquee and Nautiyal (1999) such trends also increases the risk of losing bulk of indigenous knowledge related to animal breeding and environmental management.

Access to other profitable economic activities like collecting highly valued fugal species, *Cordyceps sinensis* in alpine regions and inadequate basic services facilities in remote places were some other reasons for decreasing trend in yak rearing central and western Bhutan (Gurung, 2012). According to Bhutan National Statistical Report, 2013 (ADB, 2013), income generation from wage labour and sale of vegetables and fruits is the number one cash income sources for yak rearing gewogs of Haa, which might also support the fact that trend of yak rearing is decreasing. Department of livestock in Bhutan also acknowledges the decreasing trend in yak rearing without much change in yak population (DoL, 2013), mainly because those herders leaving the yak herding either sell their herds or leave the herds with the remaining herders (Gurung, 2012).

## Conclusion

Once the 2007 Land Act is enforced the customary rangeland management practices and traditional institutions are likely to breakdown and lose their significance for the yak herders. Over the years farm labour shortage and reduction in number of yak rearing households have reduced overall grazing pressure in the alpine zones. However the grazing pressure in winter grazing sites for the yaks in the temperate region is likely to increase significantly due to; 1) year round grazing in most of the grazing sites, 2) shrub encroachment in remotes grazing sites, 3) limited improved fodder and supplementary feeds and 4) interruption of transhumant migration of cattle from Haa to neighbouring dzongkhags. The change in dynamics of rangeland management systems in long run is likely to change the high-altitude rangeland ecosystems. The change threatens livelihood of the yak herders by making them more vulnerable to environmental and economic changes. The issue of heavy grazing in temperate zones could be the top priority issue to be addressed before implementation of the Land Act, 2007.

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