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Economics of Yak herding in the Kanchenjunga landscape of the Eastern Himalayas

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Abstract

Yak herding is one of the oldest market-based traditions, which is part of an integrated social-ecological system. But, it is at risk of extinction as yak herders are gradually shifting towards alternative occupations. The discontinuation of herding may have several implications such as loss of culture and degradation of the rangeland ecosystem. Though yak herding is not limited to the financial aspect of herding, this is considered a main cause of the discontinuation. Therefore, it is important to understand the economics of yak herding. A benefit–cost analysis of yak herding was carried out based on the interviews with 60 yak herders in the Kanchenjunga landscape, Nepal. The results indicate that yak herding is not financially attractive. High mortality of calves and adults is threatening this occupation, and degrading rangelands are increasing the costs. Yak herding generates substantial amount of social and ecological benefits in terms of preserving culture, maintaining rangeland ecosystems and curbing illegal activities. If these benefits are included, then the benefit–cost ratio and internal rate of return would be 1.32 and 10.44 respectively. Since yak herding generates low direct profits and requires herders to stay in remote areas, there is a high risk of discontinuation of this profession by successive generations of youth. This study suggests to improve rangeland management through prescribed burning and provisioning of health services, particularly in summer pastures and incentivize yak herders for generating positive externalities.

Keywords Benefit–cost analysis, Controlled burning, Mountain, Outmigration, Rangeland

Introduction

Yak herding remains one of the dominant economic activities and a tool of rangeland management in the high mountains. Herders do not regard it as simply a means of earning an income but as a vital part of culture and tradition (Dorji et al. 2020). Yaks maintain the profession of people; their livelihoods and culture; shape land use and migratory routes in the high mountains (Wouters 2021). Yak produces an array of products such as dairy, hair, skin and meat. Yaks make herders entrepreneurs through the further processing of yak products. For instance, herders weave blankets and cloths from hair, use skin for tents and make butter and cheese. They use yak dung for cooking, when the fuelwood supply is in shortage, and yak are also used for transportation, particularly in areas where there is no access to roads. In addition, herding maintains the rangeland ecosystem by surpassing the growth of the woody vegetation in the rangeland, which is essential for increasing forage availability (Teague et al. 2008). The transhumant system adopted by yak herders, namely, seasonal movement between winter and summer, is considered an adaptive mechanism to minimize the negative effects of water and forage scarcity on herding activity (Wakeel and Sabah 1993). Seasonal mobility allows rangelands to regenerate by reducing grazing pressure.

This social-ecological system is faced with several challenges in the changing socio-economic and environmental context. Improved road accessibility has increased

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accessibility to schools and opened up new economic opportunities for young people in the high mountains increasing, in turn, the outmigration of rural youth (Schwilch et al. 2017). Hence, sacrifice of opportunities for education and enjoyment of modern life is the opportunity cost associated with yak herding for youth as yak herders must spend at least 6 months of the year in remote areas guarding their yak. Therefore, a question hangs over the continuation of transhumance pastoralism given its relative unprofitability as well as the new generation's attraction towards modern economic development (López-i-Gelats et al. 2015; Gentle and Thwaites 2016; Pasakhala et al. 2021).

Among the challenges is the changing global environment which is posing a threat to yak herding. The variation in temperature and snowfall is affecting the seasonal movement of herders (Feroze et al. 2019). Yak deaths have increased in recent years due to snowstorms in the Himalayas. Moreover, rangeland health is compromised through the introduction of invasive plants and the drying up of water sources (Duncan et al. 2004; Naz Mirza et al. 2009). Global warming has led to an increase in the length of the vegetation growing season and growth rate, increasing, thereby, brush density (Archer 2010). As a result, rangeland is shrinking with an attendant decline in forage quality and quantity leading, in turn, to decreased milk production (Wangchuk and Wangdi 2018). Compounding the problem is government restrictions on the free movement of yak, which leads to in-breeding as well as decline in the productivity and health of the yak (Dong et al. 2009). These factors are pushing yak herders out of their traditional occupation and into alternative livelihood options. As a result, yak herding is vanishing gradually from the high Himalayas (Joshi et al. 2020).

This may disconnect the interaction between highland people, livestock and rangeland, which ultimately encourage the drivers of rangeland degradation. This poses a threat to the existence of culture, traditions and people's sense of identity, on the one hand, and rangelands of the high mountains, on the other hand. Although yak herding is not limited to the livelihoods of herders in the highland, the discontinuation is mainly driven by the profitability of this occupation. Therefore, it is imperative to understand the economics of yak herding to support and promote sustainable yak herding practices that can ensure the continuation of this important cultural tradition, so that an appropriate strategy can be devised to maintain yak herding in the high mountains. The present study estimates the benefits and costs of yak herding in the Kanchenjunga landscape, Nepal, and carry out a sensitivity analysis in order to understand the determinants of profit and loss.

Study area

The Kanchenjunga landscape (KL) extends over an area of 25,085.8 sq km and covers diverse ecological zones in eastern Nepal, Sikkim and Darjeeling Himalayas of India, and western Bhutan (Gurung et al. 2019). The study was carried in three rangeland sites of the Kanchenjunga landscape, Nepal, namely, Phalelung and Yangwarak of Panchthar district and Sidingwa, of Taplejung district. The main reason behind the selection of these sites was the similarity in transhumance practice. Livestock production is one of the dominant economic activities in these sites. The total number of yaksheds in the area is 60 out of which 33 are in Phalelung, 14 in Yangwarak and 13 in Sidingwa (Fig. 1). Herders here have only two sheds for summer and winter and they must move them once in each season. The study was conducted in the fourth week of October and some yak herds had already moved down towards the village, particularly in Sidingwa and Yangwarak, by the time we carried out the interviews as it was the end of October.

In Yangwarak and Sidingwa, the duration of stay of yak herders in summer pasture is about 6–7 months while it is 8 months long in Phalelung. In the case of the former, the herds start to move down to the village for winter pasture from October 15 whereas in Phalelung it begins on November 15. Further, they move up to summer pasture around February 15 in Phalelung. The yak sheds found in the lowest altitude during the survey period were 2115 m and 3549 m above the mean sea level in Sidingwa and Phalelung, respectively.

Methods

Data collection

Two methods were used in the study to elicit the required information from yak herders in the study area: a questionnaire survey and focus group discussions. To prepare the questionnaire survey, two focus group discussions were carried out in Phalelung, Panchthar and Yamphudin, Taplejung with local stakeholders including yak herders and local government representatives, including officials of the rural municipality, as well as civil society organizations working to support livestock management in the area in January 2021. Discussions were mainly guided by open-ended questions. Issues related to yak herding and rangeland management were discussed at this stage. The discussions also focused on the role of the local government in promoting yak herding and the impact of government policies on rangeland management. During the focus group discussions, participants, particularly herders, suggested ways to

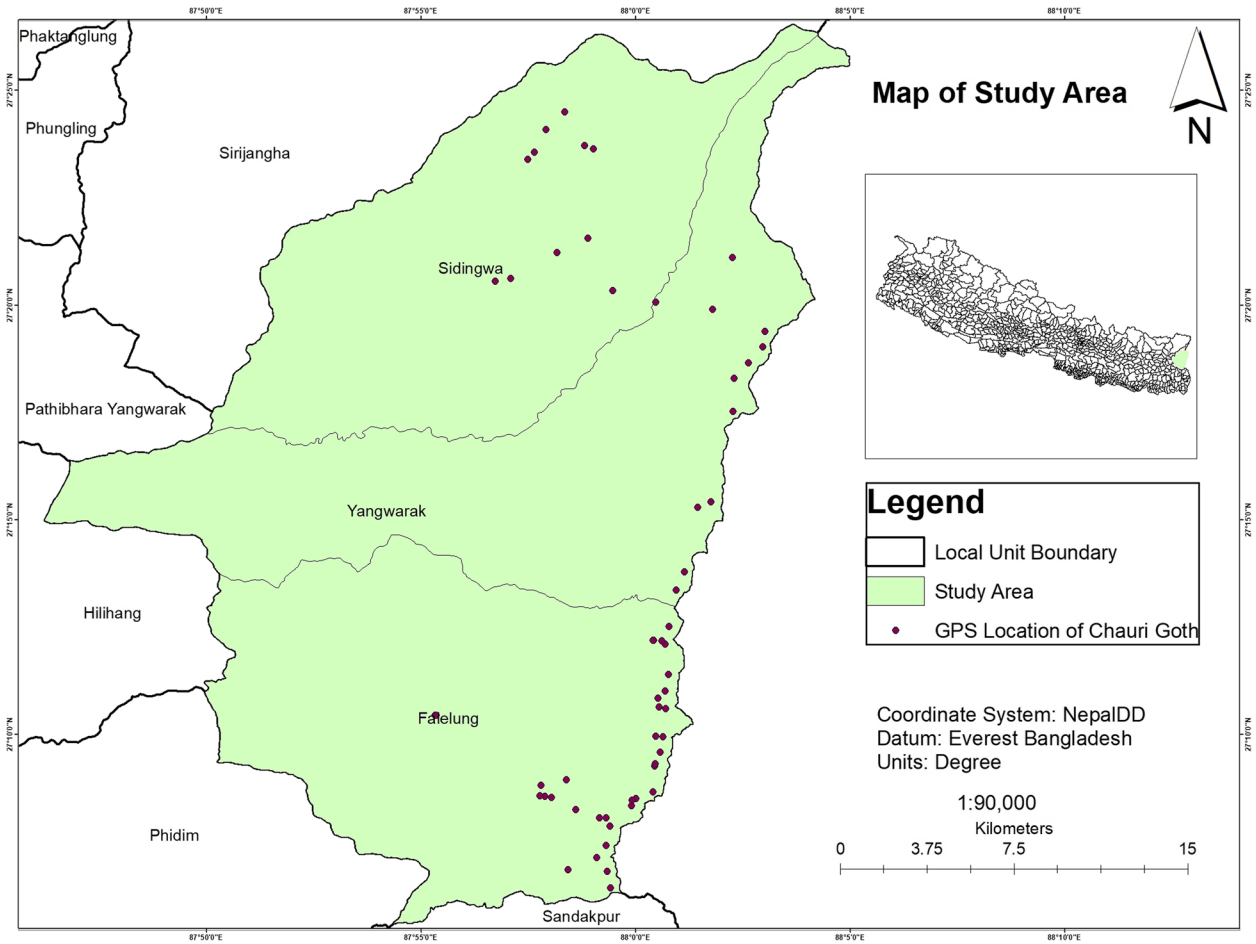

Fig. 1 Map of the study area

Table 1 Benefits and costs items related to yak herding in the Kanchenjunga landscape of Nepal

Benefits	Costs
• *Chhurpi* (hard-dried traditional cheese) • Butter • Yak fibre • Meat • Cultural value • Tourism (yak shed stay) • Net income from the alternatives	• Purchasing yak, *chauri* (female yak) and calf • Forage and supplementary food • Time contribution of herders/labor cost • Shifting yak shed • Fees (pasture, municipality registration, group membership) • Medicine

minimize the problems associated with yak herding and how to improve it.

The focus groups identified the benefits and costs associated with yak herding. They also shared the general production costs/prices associated with yak herding. The focus group participants said that all herders produced equal quantities of butter and *chhurpi*. They said further that they do not prefer to sell milk as there is no market for the milk (Table 1).

As revealed in the focus group discussions, a *chauri* gives birth for the first time at the age of 3 years and continues up to the age of 25 years. According to experienced herders, a *chauri* is likely to give birth up to 19 calves over her lifetime. They usually calve once every other year (Degen et al. 2007). The maximum productive age is between 6 and 11 years.

A *chauri* yields 5 l of milk per day for around eight months per year. The market price of the animals is as follows:

- Adult *chauri* (female yak): NPR[1] 70,000/
- Calf (she): NPR 40,000.00

[1] NPR is Nepali currency. 1 USD = NPR 115.

- Calf (he): NPR 35,000.00
- Adult yak (male): NPR 100,000

In the rangeland area, the market price of chauri/yak products is as follows:

- *Chhurpi*—NPR 900/kg
- Butter—NPR 600/kg
- Fibre—NPR 500/kg
- Meat—NPR 400/kg

Questionnaire development and survey administration

The questionnaire was developed based on the focus group discussions. Local enumerators were recruited to administer the interviews and they were oriented on the questionnaire and trained to carry out the interviews with the choice set. In addition, they were supervised by the research team. The questionnaire was piloted with the local people and updated based on the feedback. Before starting the interview, the enumerators read a plain language statement about the research and ask the yak herders for their verbal consent to take part in the interview. After their consent, interview was carried out with the questionnaire in October 2021. The contents of the questionnaire included information related to the practices, benefits and costs of yak herding and the risks entailed in yak herding.

Data analysis

A benefit–cost analysis of yak herding was carried out based on the actual benefits and costs of yak herding. Since there is variation in the cash flow during different periods (R), the present value (PV) was calculated from Eq. (1). The time period (t) for this estimation was 25 years, which is the yak's milking age. Thereafter, herders use the yak for their meat. The discount rate (i) calculated for this estimation is 5%, which is the average interest rate for an agriculture loan, depending on the base rate of the individual bank.

$$\mathrm{PV}(i,N) = \sum_{t-0}^{N} \frac{Rt}{(1+i)^t} \quad (1)$$

In addition, the benefit–cost ratio was estimated as the ratio between the present value of the benefit and cost. Similarly, the internal rate of return was estimated to calculate the yield from the investment in yak herding. The following assumptions were made for the benefit–cost analysis:

- Each shed will have 23 *chauris* and one yak (based on the existing number).
- Calf mortality is 40% (Degen et al. 2007).
- The sex ratio between male and female calves is 1:1.
- Yak herders start to sell calves from the second year.
- The estimation of *chauri* products is based on the existing sale, volume.
- The price and production are constant over the year.

The benefit–cost analysis is based on certain assumptions, but these assumptions may not hold due to the uncertainties. Therefore, a sensitivity analysis was carried out to measure and evaluate the possible uncertainties (Jain et al. 2011). Five different scenarios were identified based on the existing situation in yak herding and the changing economic context. Two issues were considered while developing the scenarios for the sensitivity analysis. The first was animal mortality, which is considered the greatest risk to yak herding (Dorji et al. 2022). The second was the propensity for outmigration among youth in the mountain area, which is a critical issue in maintaining the traditional occupation (Schwilch et al. 2017). The scenarios are as follows:

a) Scenario I: An average adult yak mortality rate is one every other year.
b) Scenario II: The combination of scenario I and calf mortality reduce to 30%.
c) Scenario III: The combination of scenario I and calf mortality reduces to 20%.
d) Scenario IV: The combination of scenario I and the practice yak herding is using hired labour with minimum wage rate NPR 15,000/month.
e) Scenario V: The combination of scenario IV and social value of yak herding. Here, social value is estimated as the difference between the income from alternative opportunity and minimum wage.

Results

Socio-economic characteristics of the yak herders

Of the total number of respondents 60, only three (5%) were female. This may be because the interviews were carried out in the yakshed which is managed by a male member when most of the yaks are in the summer pasture. Moreover, more than three-fourths (78%) of the herders were from the indigenous community while the rest (22%) were from the Brahmin/Chhetri ethnic group. The age of the herders was between 21 and 62 years. Among them, only seven (12%) were below 25 years of age while fourteen (23%) herders were above 51 years of age.

A total of 1460 *chauris* were reported from the 60 sheds with an average of 24 *chauris* and one yak per shed. The herd size ranges from five to 52 *chauris*. The average herd

size was higher in Yangwarak (29.64) while it was the smallest in Phalelung (18.76). Some herders raise other livestock such as goat, sheep, cow and buffalo in addition to yak. Of the total number of herders, one-third (20 herders) raise only *chauri* whereas the rest (40 herders) kept other animals. The average annual income is NPR 450,833 (USD 3920) per family. The income from yak herding accounts for 72.71% of the total annual income,[2] on average, ranging from 40 to 100%.

Yak herding was not a hereditary occupation for all herders. There were a few newcomers (15%) who had initiated herding on their own due to reasons such as lack of alternative livelihoods and the belief that yak herding is a profitable business as it can be linked with tourism. A majority of the herders indicated that the rangeland was not sufficient to fulfil the forage demand of *chauri* and that, therefore, they have to purchase supplementary food to feed their animals.

About 60% of the herders use rangeland in the community forest and 37% use private rangeland while the rest combine their own pasture with community forest. However, there is a ban on controlled burning inside the community forest. Almost half of the yak herders (45%) are happy with the existing condition of rangeland while 17% are satisfied and 38% are dissatisfied. About 48% stated that, in their experience, the rangeland condition is degrading while 20% said that they had not experienced a change and 32% said that they had experienced improved conditions in rangeland. Nevertheless, all of them said that rangeland do not provide sufficient forage for their animals. As a result, their annual expenditure on grain supplements is NPR 32,875 (USD 286) per shed.

The herders identified several issues related to yak herding, among them, disease, water availability, invasive species, wild animal attacks and rangeland degradation. Eighty-five percent of the yak herders have lost *chauri* in the last 5 years due to these problems. The mortality rate was estimated at 55.2 *chauris* per year. By yak herd cluster, annual mortality was 23 in Phalelung, 13 in Sidingwa and 19 in Yangwarak. Among the reasons for *chauri* deaths were accidents, disease, wild animal attacks and age. Of the herders interviewed, 90% and 87% of herders, respectively, also mentioned the problems associated with not having health care services and non-availability of veterinary doctors. Although a market exists for products currently produced, herders have an interest in value addition to *chauri*/yak products in the form of cheese or milk powder. An emergent issue is conflicts with pasture owners (individuals or community forest users).

[2] Nepal per capita income for 2021—$1208.

Consequently, 24 (40%) of the herders believe that a threat exists for yak herding in the future. This is because young people are not interested in engaging in yak herding. In the herders' opinion, young people are attracted to a modern lifestyle, and they regard yak herding as a time-consuming though unprofitable job connoting low social status. Hence, they are more interested in securing employment abroad or engaging in other off-farm activities. The solution, as 77% of herders see it, is to link yak herding with tourism to attract a younger generation.

Cost of yak herding

Yak herders spend around 6.23 months on average in summer pasture and approximately 5 months in winter pasture. Thus, they spend around 9.93 months on average in yak keeping. The herders were asked what they would have done if they were not in yak herding. Of the total respondents, 40% selected business followed by employment abroad (35%), employment within the country (13%) and agriculture (12%). The estimated income from these alternative jobs was considered as an opportunity cost, which is estimated NPR 355,400 per year.

More than two-thirds of the herders (77%) stated that yak herding is an occupation that affords self-reliance and 17% indicated that yak herding provides an opportunity to live close to nature while the rest said that they chose the occupation to ensure the continuation of their ancestral occupation and culture. The annual cost of yak herding is the registration fee, which is a one-time cost as reported in Table 2. In addition, there is the cost of yak purchasing, which is discussed in the "Methods" section.

Benefits of yak herding

Income from yak covers around 72.71% of the total household income, on average, ranging from 40 to 100%. Yak herders prefer not to sell milk. Instead, they sell *chhurpi* (hard curd cheese) and *ghee* (butter), which are processed in the yak shed. These are the main commercial products of *chauri*. The average annual income from the yak is reported in Table 3. In addition, opportunity exists for other income from selling calf and meat as well as tourism. In recent years, yak herders have started "Shed Stay (Goth Stay) to link tourism with yak herding. But, of the total number of herders interviewed, only 7% had started *Goth Stay* up to now. Yak herders also sell the meat after the *chauri* ceases to produce milk. The cost presented in Table 3 is the average annual benefit from selling calf meat from the fifth year onward.

Yak herding also offers several environmental benefits. When herders were asked to share their understanding of the environmental benefits of yak herding, they responded that it helped to control brush encroachment

Table 2 Average costs of yak herding per shed

Particular	Amount in NPR (USD)	Remarks
Opportunity cost	355,400 (3090)	Annual income from the potential alternate occupation
Rangeland annual rent	12,379 (108)	Rent paid to community forest and private owner (annual)
Grain supplement	32,875 (286)	Food provided to yak/*chauri* due to the shortage of fodder (Annual)
Registration fee	2587 (22)	Registration in local municipality and own group (one time)
Medical expenditure	11,025 (96)	Annual
Yak shed shifting	468 (4)	Paid to labor (annual)

Table 3 Average annual benefits of yak herding per shed

Benefits	Mean (SD) in kg	Amount in NPR (USD)	Description
Fibre	0.45 (1.85)	225 (1.95)	Annual
Chhurpi	464.33 (400.70)	417,897 (3634)	Annual
Ghee	375.10 (209.48)	225,060 (1957)	Annual
Tourism	-	8500 (74)	Annual
Calf	-	517,500 (4500)	Annual from the fifth year

in rangeland (93%) thereby facilitating the Red Panda's movement (92%). Furthermore, 87% of herders said that it had reduced the poaching of wild animals while 85% said it had reduced illegal logging and 82% said it had prevented encroachment. At the same time, yak herding is contributing to promoting tourism as the herders of the area celebrate the annual "Yak Festival" during the Nepali New Year.

Benefit–cost analysis

We carried out a benefit–cost analysis based on the assumptions made in the data analysis section. The estimated present value of benefits and costs for the given time period are NPR 12,718,772 (USD 110,598) and NPR 13,768,825 (USD 119,729), respectively. The benefit–cost ratio is 0.92 and the internal rate of return is 3.30. The lower return may be due to the inclusion of the opportunity cost as the present value of the opportunity cost constitutes 36 of the total present value of the cost. The exclusion of the opportunity cost produces a benefit–cost ratio of 1.45 and internal rate of return (IRR) of 10.74. The results of the sensitivity analysis are presented in Table 4.

The sensitivity analysis indicates that the benefit–cost ratio and IRR increase with reduced calf mortality. Yak herding would be more beneficial when there is hired labour as per Scenario IV and when the herder takes up other income-generating activities. But, if the social benefits of yak herding like preserving traditional cultures and practices, supporting local economies, maintaining rangeland ecosystems, living with family and curbing illegal activities are added as in scenario V, then herding would be more attractive financially.

Table 4 Sensitivity analysis of the benefit–cost ratio and internal rate of return

Scenarios	PV of benefits	PV of cost	Benefit–cost ratio	IRR
Scenario I	12,718,772 (110,598)	13,933,605 (121,162)	0.91	3.05
Scenario II	12,866,085 (111,879)	13,933,605 (121,162)	0.92	3.29
Scenario III	13,385,558 (116,396)	13,933,605 (121,162)	0.96	4.14
Scenario IV	12,718,772 (110,598)	11,449,414 (99,560)	1.11	6.91
Scenario V	15,202,962 (132,200)	11,449,414 (99,560)	1.32	10.44

Discussion

Despite the fact that yak herding is the oldest commercial activity in the high mountains, the analysis indicates that, in the current context, yak herding is not financially attractive. This findings aligns with existing studies that have indicated yak husbandry as a less profitable business compared to the husbandry of goat and sheep because of productivity and the quick turnover of the latter (Errang 2019; Khadka and Thapa 2020). In the Himalayas, yak herders also keep other livestock and engage in subsistence farming to supplement their livelihood(Gyamtsho 2000). The results of our study, particularly the calculated IRR, indicate that yak herding would be financially

viable only with incentives to rear yak. This is because subsidies and incentives contribute to enhance agricultural productivity (Garrone et al. 2019) and prevention of grassland deprivation (Lin et al. 2022), as it encourages farmers for innovation and technology adoption (Omotilewa et al. 2019).

It is therefore necessary that the government recognizes and acknowledges the role of yak herders in preserving the rangeland ecosystem, highland tradition and culture; and their contribution towards the local economy by devising different models such as development of community cooperatives and value addition of yak products to attract more herders for yak herding (Foggin 2021). This argument is supported by the highest IRR and benefit–cost ratio, while social benefits of yak herding are included in the analysis as evident in Table 4. This supports the existing belief that yak herding is part of the culture and tradition of the high mountains and not just a livelihood option (Dorji et al. 2020). This is also supported by the fact that a few herders are continuing this occupation as an ancestral occupation and part of their culture. In addition, not only indigenous community, but also people from other ethnic groups living in the highland are involve in this occupation. This means yak herding is key to establish human civilization in the highlands (Wiener 2013; Joshi et al. 2020). This may suggest that providing incentive for the herders for their contribution to maintaining rangelands and preserving culture can motivate them to continue herding. For instance, implementing payment for ecosystem services scheme may compensate herders for their efforts (Carriazo et al. 2020; Upton 2020). This makes yak herding financially attractive.

Yak herders maintain the rangeland ecosystem through the practice of controlled burning and brush cutting to increase fodder production (Humphrey 1962; Dong et al. 2007; Limb et al. 2016). However, rangeland in Nepal falls under the jurisdiction of the Ministry of Forest and Environment. Nepal's Forestry Sector has given higher priority to community forestry programme. This programme involves local people in forest management as community forest users. This means those who live close to forests (usually less than 5 km from the forest) can participate in forest management activities physically and can be registered as forest users (Rai et al. 2017). This provision has kept these seasonal and distant users out of community forest management and resource utilization (Kanel and Kandel 2004). Some activities of community forest user groups may have adverse impacts on forest production. First, they manage community forests for the production of timber, fuelwood and fodder (Adhikari and Lovett 2006; Rai et al. 2016). Second, community forest user groups are preventing prescribed burning and grazing, in order to improve the forest conditions (Sapkota 2017; Shrestha et al. 2017; Gaire and Ghimire 2019). This applies to rangelands, which fall under the jurisdiction of community forest user groups. But most of the herders feel that rangeland conditions are showing signs of degradation compared to the last 5 years. Invasion by woody vegetation is one of the major causes of rangeland loss (Limb et al. 2010). Herders believe that grazing increases rangeland productivity as free-range yak supply nutrients through urine and dung. In addition, grazing may improve rangeland health by controlling weed invasion (Frost and Launchbaugh 2003). This has led to conflicts between nomadic pastoralists and community forest users (Pant et al. 2017). This may lead towards the discontinuation of yak herding, which threatens the integrity of rangeland ecosystems.

Another benefit of yak herding is that it increases the presence of herders in remote areas. In these remote areas, the government is not able to provide proper services to the citizens (Dawadi and Shakya 2016). Herders' presence in remote areas can be regarded as providing a free service to the government as local guardians, particularly to minimize illegal activities. This shows that nomadic pastoralists are important stakeholders of natural resource management in the high mountains. This means yak herding is contributing to protect resources and to curb illegal activities, which can be accounted as their benefits.

It is apparent from the results that calf mortality is a serious threat to yak herding as frequent calf mortality impacts profitability. The higher rate of yak calf mortality is one of the main causes of the low yak population in the Himalayas (Acharya et al. 2014; Bera et al. 2015). Among the main causes of calf mortality are diseases, predation and climate (Acharya et al. 2014; Bera et al. 2015; Kar and Thungon 2015; Anzai et al. 2021). Lack of health facilities in the high-altitude pastures, particularly in the summer pastures, is challenging. As yaks are free-ranging animals and most of the rangelands, particularly summer pastures, are close to protected areas, there is a high probability of predation by wild animals. Therefore, it is also important to have access to financial institutions to purchase yak to maintain yak herding to prevent losses due to high mortality (Degen et al. 2007).

Conclusion

The findings of this study suggest that improving rangeland management would lead to an increase in forage production and, thereby, reduce the cost of grain supplements. In this context, it is vital to review the provisions on prescribed burning as it is an important aspect of rangeland management. The Divisional Forest Office may consider facilitating prescribed burning under the

supervision of forest user groups in the community forest operational plan. Similarly, the provisioning of veterinary services, particularly in the summer pasture, would also help as health is a dominant cause of yak mortality. This can be managed in coordination with the local municipalities.

Finally, our work suggests that yak herding could attract younger herders if more visibility was given to the herders' contribution towards preserving the culture, maintaining the rangeland ecosystem and promoting the local economy. This can be done by incentivizing the yak herders for their contribution towards maintaining the rangeland ecosystem and linking yak herding with tourism. Other options would be establishing milk-processing industries to produce cheese and milk powder which would increase the earnings of herders. But, for this, it is necessary to prepare a business plan with the possibility of long-term investment after further investigations into its feasibility.

Yak herders provide global services, such as maintaining the health of highland ecosystems, and transhumance, which eventually contribute to the preservation of culture, tradition and social ties in the highlands, yet these global services are often overlooked. Moving forward, the value of such critical socioecological services to the global community should be explicitly considered and duly accounted, so that yak herding receives appropriate attention and support in light of its local and global contributions and benefits.

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Authors' contributions
RKR—conceptualization, field work, data analysis, first draft writing and reviewing. SJ—conceptualization, field work, writing and reviewing. TD—conceptualization, writing and reviewing. BP—conceptualization, writing and reviewing. The author(s) read and approved the final manuscript.

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