



# Changing Rural Livelihoods and Forest Use Transition in the Middle Hills of Nepal

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## Abstract

In recent decades, out-migration has become a key livelihood strategy for many rural households in the middle hills region of Nepal. In this region, rural communities are key actors in the management of local resources such as community forests. Analysis of the link between community forests and out-migration is largely missing in the literature, even though the demographic changes associated with out-migration affect forest resource use and management. This article discusses how rural communities and traditional landscapes in the middle hills are changing following out-migration and how this process has changed the management by rural communities of local forests (including community forests). Overall, the research found a reduced dependency by households on forest products (e.g. firewood, fodder and timber) sourced from community forests. Also, the reduced demand is being supplied increasingly from trees/forests grown on private farmland, including natural regenerated forests and trees planted on abandoned farmland. The declining need for forest products and the lack of an economic incentive for active forest management coupled with a decreasing sense of community has reduced the interest in community forests, leading to less intensive and infrequent forest management. Given the prevalence of out-migration and the changing socio-economic context in the middle hills, it appears time to reconsider the management of community forests beyond a narrow range of uses to enable greater commercialization and encourage ecosystem services to be harnessed so community forests better align with contemporary rural livelihoods and landscapes.

**Keywords** Abandoned farmland · Community forests · Forest management · Forest products · Land-use transition · Out-migration

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## Introduction

### Out-Migration, Rural Livelihoods and Transitioning Forests

Out-migration is an ongoing and widespread global phenomenon that has become a key component of livelihood strategies in an increasing number of countries, including Nepal (Acharya and Leon-Gonzalez 2014; Choithani 2017). Out-migration has been identified as a key factor influencing natural resource management, land-use decisions and land-use transitions (Lambin et al. 2001; Zimmerer 2010; Chen et al. 2014; Tabassum and Haq 2014; Jaquet et al. 2015; KC and Race 2020a). There is ample literature demonstrating the relationship between out-migration and changes in forest cover in different parts of the world, including developing nations (Lambin et al. 2001; Rudel et al. 2002; Barbieri and Carr 2005; Walters 2016; de Jong et al. 2017; KC et al. 2017; Oldekop et al. 2018; Ervin et al. 2019): leading to a phenomenon known as the ‘forest transition’ (Mather and Needle 1998).

Forest Transition theory (FTT)—the explanatory concept of why forest loss moves to a situation of forest gain on a landscape scale—provides a framework to understand how land-use decisions are made and the influences that lead to the regeneration of forests on former farmland (Mather 2007). Out-migration and declining rural populations are common factors that lead to forest regeneration. These factors are signals of the modernisation of a national economy (Mather 2007) and can alter the value of land-use in favour of forests. At a broader scale, globalisation can also reinforce structural changes in an economy. Others have argued that the FTT ‘... should be broadened to a theory of land use allocation’ (Barbier et al. 2010, p. 99), with forest cover changing over time as the relative value of different land-use options change. These authors also point out that while land-use reflects the prevailing context, it may not necessarily be optimal as the failure of markets, policies and institutions can distort the decisions made by farming families. Research in Latin America found that when households received higher remittance income, there was less clearing of forests (Hecht 2010). However, the relationship between remittance income and land-use is complex, as when the additional income is used to increase livestock or intensify farming, then further forest degradation may occur. Yet when high levels of remittance income occur with low prices for agricultural production, then additional funds are typically invested off-farm, such as in education, housing and purchasing of food and appliances (Hecht 2010). Others have found that forest regeneration can occur even when national per capita income is relatively low, such as when the utilitarian value of forests exceeds that of agricultural enterprises (i.e. a state of ‘forest scarcity’). In such cases, forests may naturally regenerate or be deliberately established (Rudel et al. 2005).

### Changing Rural Livelihoods in the Middle Hills of Nepal

About 50% of Nepal’s population lives in the country’s mountains and hilly regions (CBS 2012). Traditionally, small-scale, subsistence-based and labour-intensive agriculture was a major source of livelihoods in the middle hills of Nepal, where

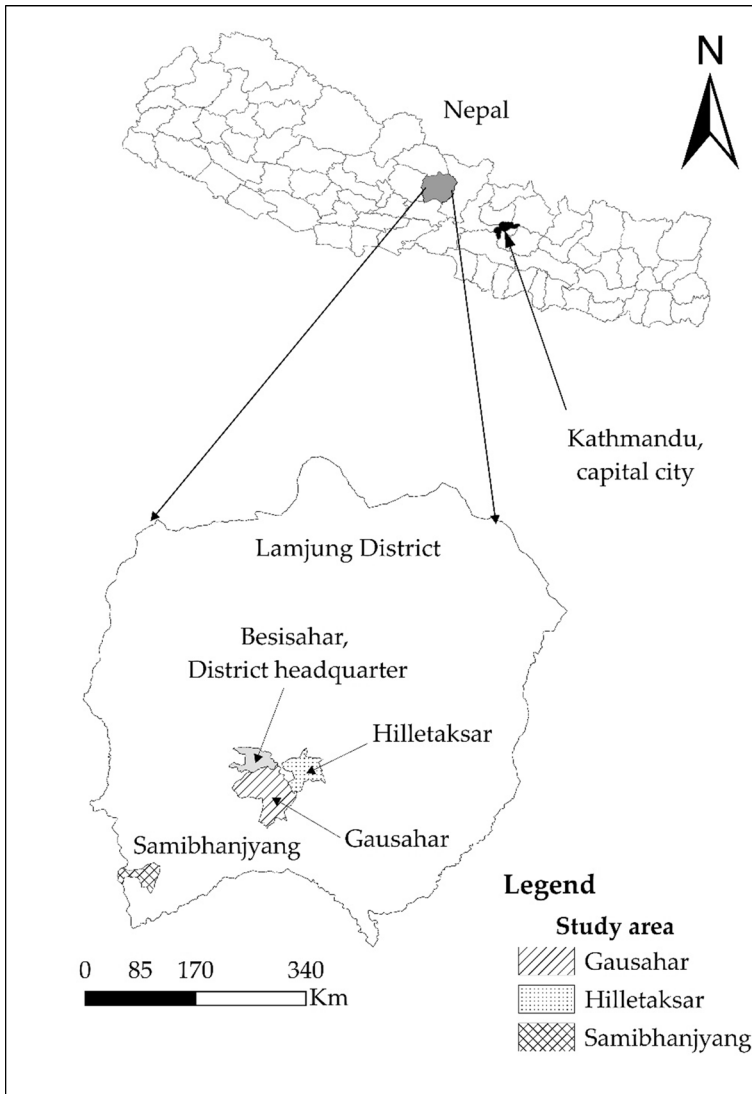
forests and livestock form integral parts of complex farming systems (Carter and Gilmour 1989; Gilmour and Nurse 1991; Thapa 1996; Garforth et al. 1999). Farm animals provide manure for crops and household trees (Neupane et al. 2002; Degen et al. 2010), and forests are a major source of firewood, fodder, leaf litter and timber (Yadav 1992; Amatya and Newman 1993; Palikhe and Fujimoto 2010). The majority of forests in Nepal's middle hills are 'community forests' (CFs) where almost all designated forests are national forests. CFs are forests that have been 'handed over' to communities with permanent use rights. Communities are primarily responsible for protection, management and utilization of designated CFs according to an approved operational plan, but the forests remain national forests.

In recent decades, out-migration has become a key livelihood strategy for households in the middle hills of Nepal, where 85% of migrants are from rural families (CBS 2012). Recent data indicates Nepal's remittance income accounted for about 27% of the country's GDP in 2017. This makes Nepal the fourth highest remittance recipient as a share of GDP among all countries (top recipient among the countries in the South Asian Association for Regional Cooperation (SAARC) (MOLE 2018). Out-migration along with other socio-economic factors has led to de-intensification and abandonment of agricultural land and farmers are therefore moving away from traditional farming and changing to non-farming activities (Khanal and Watanabe 2006; Paudel et al. 2014; Jaquet et al. 2015, 2016; Ojha et al. 2017; Khanal 2018; KC and Race 2020a). On the other hand, many farmers have improved their livelihoods by remittance income (Bhandari 2013; Khanal et al. 2015; Fox 2016). Some studies have also found that out-migration can correlate with substantial increases in local forest cover (Walters 2016; KC et al. 2017; Oldekop et al. 2018).

As the scale of out-migration increases among rural communities, it inevitably affects local forest use and management. Thus, out-migration is likely to produce different outcomes for rural landscapes and forests, depending on the socio-economic and environmental contexts from which people migrate (Hecht et al. 2015). Yet links between forests and out-migration have been largely overlooked in the literature on migration, as well as in discussions about forest-based livelihoods. Following the increasing trend of out-migration and associated changing socio-economic contexts in Nepal, there has been little published information about how rural communities' dependency on forest products has changed. This article reports on recent research that explored how the rural landscape in Nepal is changing in the context of out-migration and its implications for the use of forest products and the management of CFs.

## The Study Area

This research was conducted in the middle hills of Nepal, as this is where government data and increasing literature has indicated that out-migration from rural communities is most pronounced. The study area is located in the district of Lamjung in central Nepal, covering an area of 1692 km<sup>2</sup> (Fig. 1). Historically, about two-thirds of the district's population depended on subsistence agriculture for their livelihoods. Approximately 32% of the district's population are of Gurung descent, 29% are of



**Fig. 1** Map of the study area

Brahmin/Chhetri descent and the remainder are from numerous other ethnic groups. Lamjung district also has a long tradition of men joining the British army, especially those from the Gurung communities. More recently, remittances from migrant workers have become a major source of income for communities in Lamjung. This

study used a similar definition of “migrant households”<sup>1</sup> as used by the Government of Nepal in the latest national population census 2011 (CBS 2012). However, we do not consider ‘marriage’ as defining a migrant household as it is the common cultural/social practice of women in Nepal to leave their parents’ houses once married to live with their spouses in their family homes.

Three case study sites within the district of Lamjung—the wards<sup>2</sup> of Gausahar, Hiletaksar and Samibhanjyan—were selected to capture varying demographic changes, land-uses, livelihood strategies, dependency on forest products, and the different ethnic composition and cultural backgrounds of households. Compared to Hiletaksar and Samibhanjyan, the rural communities of Gausahar are more connected with the district’s largest town (Besisahar), which is accessed by a 25-min drive on a sealed road. However, not all the villages of Gausahar are directly connected with this road. Samibhanjyan and Hiletaksar have earthen roads which are only functional during the dry season (about six months per year) and not usable by most vehicles in the rainy season. The study’s focus on villages in the middle hills means the findings may not be relevant to the Terai (lowlands) or other locations in Nepal where migration dynamics, farming systems, forest types and market opportunities are different.

## Methods

### Data Collection

Primary data were obtained via household surveys, in-depth interviews, focus group discussions (FGDs), and field observations. The data were collected during January—May 2018. During the data collection, the principal researcher (the primary author) stayed within the study area for several months to better understand the local context and observe people undertaking their daily tasks and social activities (e.g. village markets and meetings). All interviews were conducted in the local language *Nepali* and most were recorded using a voice recorder. In addition, informal talks were conducted opportunistically with a mix of local people while walking around the study area, observing their forest management, land-use practices and other social activities. Key points from preliminary analysis of the data were confirmed with a small number of people and groups during a second field visit in June—July 2019.

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<sup>1</sup> ‘Migrant households’ are households where one or more members are absent for more than six months (for any reason, such as marriage, employment or education). The definition includes both internal and international migration.

<sup>2</sup> The smallest local governance unit in Nepal, with each ward comprised of several villages or hamlets in the study area.

**Table 1** Details of the focus group discussions

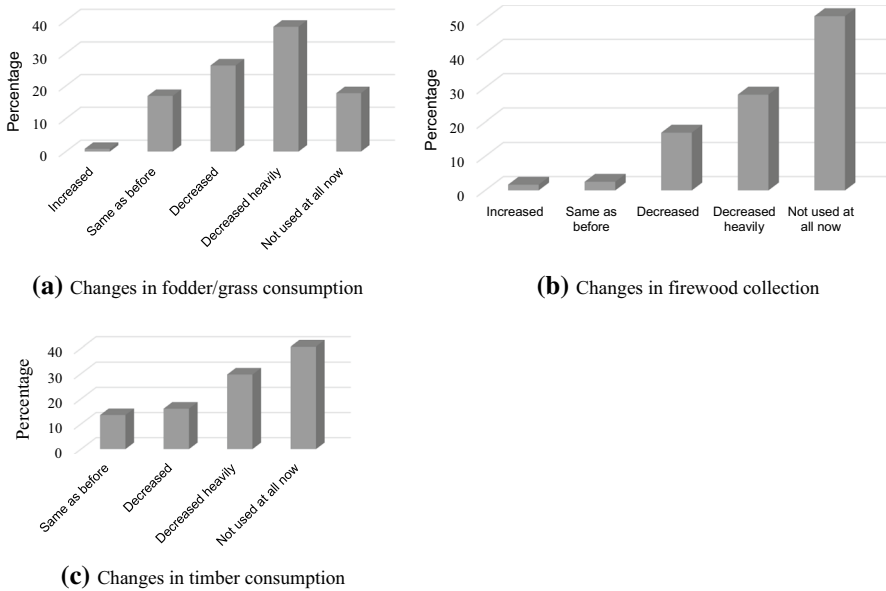
Study site	Focus group discussions	Total participants	
		Male	Female
Samibhanjyang	1×CFUG executive committee members	5	2
Hilletaksar	2×CFUGs executive committee members	11	8
Gausahar	2×CFUGs executive committee members	11	5

## Household Surveys

A total of 119 household surveys were conducted with the household head or with someone nominated by family members to collect information about rural livelihoods (e.g. consumption patterns of forest products, livestock rearing, forest management, farming, source of household income). Pre-testing of the questionnaire was conducted in the study sites before finalizing the questionnaire. The pre-testing process assisted to minimize any ambiguous questions, ensure questions were relevant to the local context and were easily understood by respondents. The time taken to complete each survey ranged from 35 min to more than an hour, depending on the time taken for rapport building and the level of interaction. Since the households were dispersed in different hamlets (sub-villages) and sometimes located far from each other (e.g. more than an hour's walk apart), and considering the time limits of the research, purposive sampling was followed to capture the characteristics and experiences of households which included both migrant and non-migrant households, different locations and ethnicities. All families involved in the household survey except one were associated with community forestry in the study area.

## In-Depth Interviews

A total of 87 in-depth interviews were conducted with individuals using a semi-structured approach. The interviewees were purposively selected based on their availability and interest to be interviewed, wellbeing status, village status, and past and/or current involvement with CFs, whilst ensuring even distribution across the hamlets (sub-villages). The households involved in the survey were largely excluded as interviewees, except for a few cases if those individuals held or used to hold an important position associated with a Community Forest User Group (CFUG) or had relevant experiences about the broader study topic. Interviews typically ranged from 30 min to more than two hours, depending upon the depth of experience and level of interest of the participant in the topics discussed. Most interviews were conducted in the participant's residence, while some were conducted in surrounding farmland, such as while farmers grazed their livestock.



**Fig. 2** Changes in forest products consumption from community forestry by surveyed households in Lamjung district, 1998–2018

### Focus Group Discussions

Five focus group discussions (FGDs) were conducted across the study area with current and former CFUG executive committee members (Table 1). Topics covered during the FGDs included changes in the use of forests and their management, land-use changes, changes in the rural economy and landscape. The FGDs varied in duration between 45 min to three hours, depending upon the group’s interest and available time for discussion. The discussions were audio recorded to minimize disruptions to the flow of conversation.

### Field Observations

Many activities related to rural livelihoods were observed during the data collection process. These included land-use practices, livestock rearing, intra-household activities, market dynamics, collection of forest products, forest management, community meetings, and construction activities. These observations enabled the events and practices to be recorded in photographs and written notes and provided a valuable context for information collected from other sources.

## Data Analysis

The data from the household surveys were analysed using the Statistical Package for the Social Sciences (SPSS, Version 24). A thematic analysis (Fig. 3) was prepared to identify topics and connections in the qualitative data from the in-depth interviews, FGDs, household surveys and field observations (King et al. 2019). Group discussions, interviews and survey respondents were asked to consider changes in their forest use and livelihoods over the past 20 years (i.e. 1998 to 2018). While it was never expected to be a precise time period as respondents had few records to refer to, it was used as a period for which respondents could consider major changes in their lives. Broad categories to gauge farmers' perceptions of change were prepared on a Likert scale to provide data about the extent and nature of change over the past 20 years (i.e. since 1998) (Fig. 2).

## Results and Discussion

### Current Socio-Economic Context in the Study Area

About 83% of the households surveyed were managed by women or elderly parents (Table 2) who, in response to out-migration for extended periods, were now largely responsible for continuing the household's farming practices. Over the past two decades, the number of residents per household has reduced by 2.31 on average. One female interviewee stated:

...now the village has become an 'old age' home...

Young men were commonly involved in foreign employment, particularly in the Gulf countries (e.g. Kuwait, Saudi Arabia, UAE and Qatar), Malaysia and in the Nepali/Indian or British armies. Others were pursuing formal education or were employed in Nepal's major cities. Villagers reported that the migration of one family member often initiated the migration of other family members. For instance, women whose husbands were involved in foreign employment or jobs in Nepali towns or cities would commonly move to road 'heads' (road junctions) or nearby towns or cities (e.g. Chitwan, Pokhara, Kathmandu), mainly for their children's education. Education has become a top priority of many households in recent years, as farmers want their children to become qualified and employed in well-paid jobs or have their own business, rather than continuing the hard work of farming. Most government schools in the villages were closed or on the verge of closing due to declining student numbers. Also, there was a growing preference for sending children to private schools in urban centres for a perceived better quality of education. This finding is consistent with Jaquet et al. (2015) who found that the remaining family members of migrant households in Nepal often migrated downstream to road junctions, district headquarters or cities with better facilities after the household started to receive remittances.

It was observed that the rural communities are becoming more dependent on the local markets for their daily needs. For instance, households are increasingly buying





processed foods such as noodles, biscuits and puffed rice for snacks, along with agricultural products (e.g. chemical fertilisers, seed, vegetables and rice) from the market. Small grocery shops were common in the study sites. For instance, remittance income was used primarily for purchasing daily consumables (75%) followed by repayments of loans, education and health expenses, and land investments (CBS 2011a).

Thatch roofing material has been replaced by galvanized metal sheeting in most households and the use of cement and steel grills for construction of buildings instead of forest materials is common. This result is consistent with the finding of the 'living standard' survey of Nepal which found that thatched roofing (straw) was used on just 18% of dwellings in 2011 from 51% in 1996 (CBS 1997, 2011b). Whereas the use of galvanised metal sheets and concrete in housing increased to 28% in 2011 from 6% in year 1996 (*ibid*). Compared to previous decades, rural households are now more frequently using modern appliances, such as cell phones and televisions at home. It is also common for households to use liquid petroleum gas (LPG), electricity and other sources of energy, such as biogas for cooking, along with improved cooking stoves, rather than primarily using firewood. The use of LPG in homes increased to 18% in 2011 from less than 1% in 1996, and other fuels (e.g. electricity, coal/charcoal, bio-gas) also increased to 4% in 2011 from less than 1% in 1996 (CBS 1997, 2004, 2011b).

Three major categories of agricultural land-use are present in the study area—*khet*, *bari* and *kharbari*.<sup>3</sup> It was common to observe fodder trees and hybrid grasses in terraces and bunds of *bari* and *khet*, and self-regeneration of native trees in *kharbari*. *Bari* and *khet* that were relatively far from the residence and close to forests, and *kharbari*, had often converted to forest by self-regeneration in most cases. Fallow *bari* and *khet* that had been left for a few months or years were now mostly covered by *Nilo gandhe* (*Ageratum* spp, an invasive weed).

Agricultural labour has become increasingly expensive in the study area, and it can be difficult to find agricultural labourers in a timely manner. This is especially so for households headed by women or elderly people that do not have any young men at home to offer as part of the traditional system of labour exchange (KC and Race 2020b). The increased availability of money in the local economy (mostly from remittances) has gradually replaced *parma/bharoparma/pakhuri sata sat*,<sup>4</sup> and the traditional practice of paying for agricultural labour with grain has completely disappeared. Remaining men preferred working as carpenters or wage labourers in non-farm sectors because of the higher income they can receive compared to farm work. Also, with increasing access to the market through road expansions and cash increasingly used in the rural economy, local paddy and maize seeds have now mostly been replaced by hybrid and improved variety seeds along with an increasing use of chemical fertilizers.

<sup>3</sup> *Khet* is relatively productive land, which is set aside for paddy cultivation. Compared to *khet*, *bari* is unproductive land and is mostly used for rainfed agriculture. Traditionally, *kharbari* is specifically managed for *khar* grass (used for making thatch rooves) and grass for livestock feed.

<sup>4</sup> Traditional labour-for-labour exchange system between neighbours or others in the villages.

Rather than using hired labour, farmers who could afford to were now using tractors for ploughing on flat farmland and vehicles to transport manure and harvested crops where possible. In addition, tractors were also used to transport firewood and timber from the forest and agricultural products wherever there was road access. Respondents explained that tractors were more convenient, faster and cheaper compared to labourers and, at the same time, it was increasingly difficult to find wage labour during the peak agriculture season. Along with semi-subsistence agricultural systems, some households, especially returnees and pension holders, were practicing specialized commercial farming such as off-season tunnel vegetable farming,<sup>5</sup> and chicken and goat farming. All these changes indicate that traditional rural livelihoods are changing, with implications for land-use and forest management.

## Changing Rural Landscape

### Decreasing Dependency on Forest Products Sourced from Community Forests

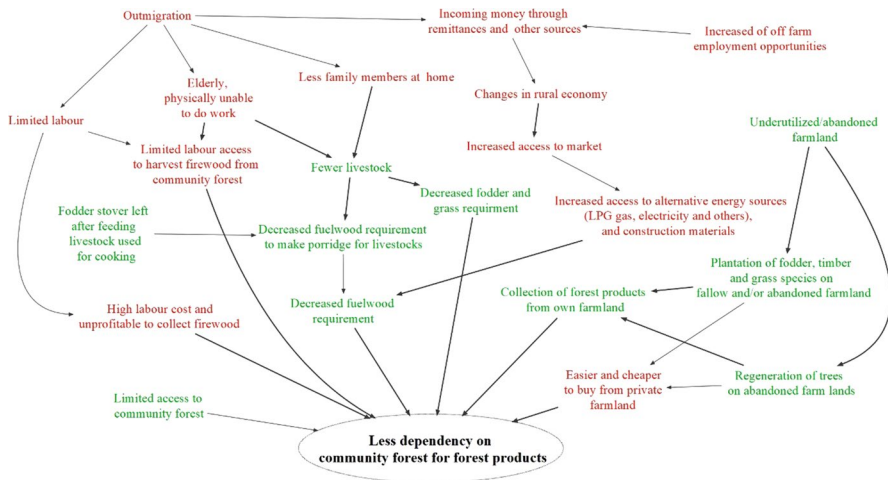
There is considerable evidence indicating that community forestry in the recent past has been successful in contributing to meet the forest product needs of local communities and improving their livelihoods (Dev and Soussan 2003; Kanel and Niraula 2004; Adhikari et al. 2007; Bijaya et al. 2015). Despite this, our research shows that the collection of forest products (firewood, fodder/grass and timber) from CFs in the study sites has decreased significantly in recent years, indicating a decline in the need for forest products compared to past decades (Figs. 2a, b and c). As much as 64% of respondents reported decreased or heavily decreased use of firewood and a further 18% reported they no longer used firewood at all (Fig. 2a). One CFUG executive committee member stated:

... in one hamlet, only seven households out of 20 submitted the application letter for firewood collection and in the end, only one household collected firewood from the community forest ...

More than half of the respondents reported no fodder collection from CFs, and a further 45% reported decreased or heavily decreased use of fodder (Fig. 2b). Just 14% of respondents reported collecting the same amount of timber as they had before, while 46% reported a decreased or heavily decreased amount of timber than before, and 41% were not collecting any timber (Fig. 2c).

Many FGD participants reported that the interest of local communities in CFs has declined due to the declining dependency on forest products and lack of other economic incentives from CFs. It is important to understand the underlying causes for declining dependency on forest products in order to better understand the changing priorities and socio-economic context of rural households, and ensure the long-term

<sup>5</sup> The plastic tunnel is a half hoop of bamboo set in the ground and covered with plastic sheet, a small greenhouse like-structure that helps to keep the soil warm and promotes germination. Vegetable crops like cauliflower, tomatoes, cabbage, cucumbers and beans are grown in plastic tunnels.



**Fig. 3** Causes of decreasing household dependency on forest products in Lamjung District, Nepal. *Note* Red text indicates socio-economic changes and impacts, and green text indicates landscape changes and their impacts

**Table 3** Household livestock status over the past 20 years (1998–2018)

Decrease in livestock <sup>1</sup> over the last 20 years				
Buffalo	Ox	Cow	Goat	Pig
–36%	–64%	–79%	–35%	–14%

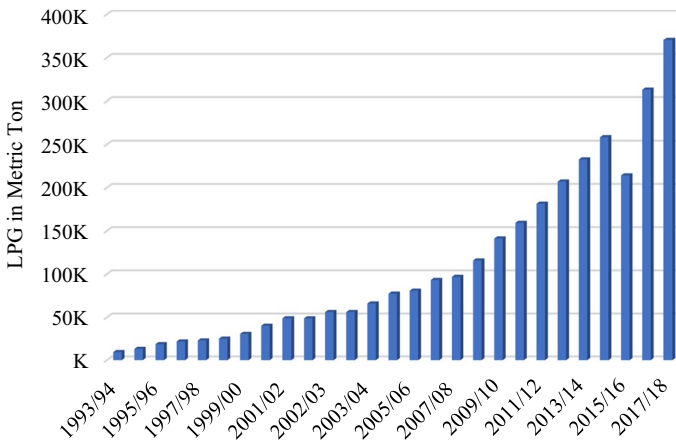
<sup>1</sup>Buffalo is mostly raised for milk and manure, while ox is primarily used for ploughing the fields. Cows are the female of the species, and have a special respect in Hindu culture.

Livestock standard unit (LSU) calculated as 1 adult buffalo = 1 LSU (Oli et al. 2015), 1 cow/ox = 0.7 LSU, 1 adult goat = 0.12 LSU, 1 adult pig = 0.2 LSU (Otte and Chilonda 2002)

sustainable management of forest resources given that most national forests in the middle hills are CFs. This study revealed a complex array of issues that has led to the declining dependency on forest products from CFs. An analysis is presented below as a summary diagram (Fig. 3), followed by explanatory discussion on the major topics.

### Common Causes for Decreasing Household Consumption of Forest Products

Survey respondents reported that compared to past decades, their firewood consumption had decreased with the decline in the number of resident family members and livestock numbers. Livestock numbers have declined considerably over the past 20 years (1998–2018) (Table 3), which is consistent with other research findings (Adhikari et al. 2007; Fox 2016; Marquardt et al. 2016) and data from the latest population census (CBS 2012).



**Fig. 4** Consumption of LPG in Nepal during 1993/94—2017/18. Source: [www.noc.org.np](http://www.noc.org.np), Nepal Oil Corporation Limited 2019

Elderly and female-headed households reported that they were physically not strong enough or unable to walk far to collect forest products. In many cases they returned from the forest without collecting firewood because of difficulties in cutting branches from tall trees and they often collected less firewood than they required. Similarly, people find it difficult to access/hire male labourers as the allocated time for harvesting firewood and timber from the CFs is limited and the same for all households and male labourers were often busy collecting forest products for their own families or engaged in other work. Moreover, it is expensive to hire labourers and the cost can exceed the value of the forest products.

### Underlying Causes of Decreasing Household Consumption of Firewood

Firewood was previously the primary fuel source for cooking all meals, but nowadays the use of firewood is largely limited to making *kudo*,<sup>6</sup> boiling milk and water, and making *raksi* or *jhad* (traditional liquor) in some ethnic groups. Elderly households and others with few family members and few livestock were found using *Ghaselta*, *Jijamija* or *Jijho*<sup>7</sup> as sources of fuel. Increased access to other energy sources such as LPG, biogas, solar energy and electricity (mainly used for rice cookers and water boilers in a few cases), along with the use of improved cooking stoves has decreased the quantity of firewood consumption and accordingly reduced collection of firewood from CFs. Most households were still using some firewood, but comparatively much less in quantity compared to 20 years earlier (i.e. 1998). Of all the surveyed households in the study area, 72% were using LPG, 59% electricity and 44% alternative energy sources (e.g. biogas)

<sup>6</sup> A home-made porridge for livestock using maize and millet flour.

<sup>7</sup> Fodder stover or stems left after feeding livestock, a traditional source of fuel.

for cooking. This indicates that the traditional use of firewood is being replaced as the primary fuel source as local socio-economic context changes. This result is consistent with national data which shows that the nationwide consumption of LPG has increased exponentially since the early-1990s (Fig. 4). Some respondents also said that given the availability of electricity and gas, they were not interested in doing the hard work needed to cook with firewood and were also concerned about the associated smoke hazard.

Also, villagers preferred collecting firewood from their own farmland rather than the CFs, as this was a more convenient and flexible option. There is an increased number of trees now grown on private farmland or on abandoned private agricultural land, which is consistent with the findings of other research conducted in Nepal (Cedamon et al. 2017; Oldekop et al. 2018).

Firewood collection is largely determined by the community's proximity to the CF blocks allocated for harvest. Harvesting firewood is labour intensive work and often labour and transportation costs were higher than the value of the firewood itself, particularly if the allocated collection block is far away from the community. One interviewee, a former CFUG chairperson, explained:

... users are not coming to cut trees anymore, some return from the forest without cutting and some don't go after an evaluation of all the costs such as labour (NRs 600–700 per day) and transportation, which can make it unprofitable ... people think it is better to buy LPG from the market which is easy and provides enough fuel for 3 to 4 months for a small family ...

Most surveyed households in Samivanjyan collected firewood in 2019 because the allocated collection block was nearby and had reliable road access, enabling the use of tractors for haulage. In the four previous years, the allocated block was located further away from the community and consequently no firewood was collected. Alternatively, with flexibility in cutting times, relatively easy access and being cheaper compared to sourcing from the CF, users preferred collecting firewood from their own farmland or purchasing firewood from their neighbours. One of the executive members of a CFUG reported that out of 26 households in one hamlet, only two collected firewood from the CF and the remaining households from trees growing on their own farmland, consistent with what was reported in other parts of Nepal (Webb and Dhakal 2011). The low value of firewood and availability of alternate fuel sources (e.g. LPG) means that firewood collection is strongly influenced by a household's proximity to forest blocks (Davidar et al. 2010; Deng et al. 2011; Fikir et al. 2016; Lax and Köthke 2017).

One woman, from a poor household, involved in a FGD reported that she was not allowed to collect as much firewood as her family needed. A few other households reported a similar view during the household survey. This suggests that restrictions on the use of forest products from CFs may have also contributed to the declining interest in and use of forest products sourced from CFs. However, it is worth noting that users were allowed to collect dead branches and twigs twice per month, or all year round, from the CF depending on the local CF operational plan.

## Underlying Causes of Decreasing Household Consumption of Fodder

Fewer livestock and the presence of more fodder trees and grass on private farmland were reported as the major reasons for decreased collection of grass from CFs. Most survey respondents (51%) claimed that they were self-sufficient in fodder from private farmland and no longer needed to harvest fodder from CFs. Also, *paral*<sup>8</sup> and *kudo* provides adequate feed for the few livestock they have. Hence, they no longer needed to go to the CF every day to collect grass, as many previously did. Some farmers reported they also occasionally buy *paral* from their neighbours. Degen et al. (2010) found that the fodder trees on private farmland in the middle hills region of Nepal may provide as much as 70% of the year-round dry matter intake of livestock.

Many women reported that the forest has become denser (thicker vegetation) compared to the past and that it was frightening to go there by themselves. Some people also stated that it was difficult to find good quality grass in the CF due to the increased forest density. Villagers reported that they are restricted from lopping fodder from living trees in the CF, except for grasses, which was reported as another reason for reduced fodder collection. Some households were collecting fodder and grasses from nearby abandoned, or underutilized, farmland instead of from the CF. In one FGD, the chairperson of a CFUG reported that:

“... users seldom visit the community forest to collect grass, mainly they just go during dry season ... about four months of the year when there is limited grass on their private land ...”

## Underlying Causes of Decreasing Household Consumption of Timber

Many FGD participants reported that the increasing accessibility of alternative construction materials (such as cement, iron rods and mesh), the higher cost of harvesting timber, the difficulty of finding labourers when needed, the difficult terrain and high transportation costs have reduced the demand for timber sourced from CFs. Also, with increased trees on private farmland, mostly through natural regeneration on abandoned and underutilized farmland, the demand for timber (*ku kath*<sup>9</sup>) from CFs has decreased, with timber sourced from private farmland typically cheaper and easier to obtain.

The FGDs also revealed that the CFs in the study area contain comparatively few high-quality Sal (*Shorea robusta*) trees. These trees are in high demand compared to *ku kath*, generally with a superior quality of timber for construction. Pokharel (2012) found that the extent of Sal in the region's CFs is an important factor influencing the forest management regime. The demand for construction timber has also been reduced with fewer *katero* (animal stalls) and *dhansar* (storage houses,

<sup>8</sup> Dry straw from paddy cultivation.

<sup>9</sup> *Ku kath* includes Chilaune (*Schima spp.*) and Katus (*Castanopsis spp.*), but these are often regarded as poor quality construction timbers.

including for firewood) being constructed, given the reduced household livestock numbers and use of firewood. Like firewood, timber harvesting is largely determined by the proximity of a village to the CF blocks allocated for harvesting. As reported by a CFUG chairperson in Hiletaksar, the demand for poles has also reduced as the use of wooden ploughs (*halo*, *juwa* and *harish*) for ploughing fields using ox has decreased. Even when timber poles are needed, farmers will usually source poles and other timber from the regenerated forests or trees on their private farmland. Many people explained that they preferred to buy and harvest timber from private farmland as there are not the time and other constraints on harvesting compared to CFs. One FGD participant stated:

... if the allocated forest block is far away, then the total cost of harvesting and transportation using labour is much higher than the value of the timber ...”

During FGDs and in-depth interviews, executive committee members of a CFUG reported that following the devastating earthquake in Nepal in 2015, the demand for timber (especially for Sal) for reconstruction had increased. However, it was very difficult to accurately trace the history of household timber use, given that traditionally each household would only use timber for construction purposes from the CF once every three years or more (partly due to restrictions prescribed in the operational plans), unlike other forest products which were traditionally sourced more frequently.

## Land-use Transition

Many respondents involved in this study reported that over past two decades the number of trees on private farmland has increased. The lack of management of *khar* in *kharbari* due to the increased use of galvanized metal sheets instead of thatch rooves and fewer livestock has led to the natural regeneration of native tree species that are commonly used for firewood and sometimes sawn timber. Based on the household survey, 64% of *kharbari* had already been converted to forest and only 17% was growing *khar* grass. The remaining area had a mixed composition including fodder trees, cash crops, *khar* and improved varieties of grass species together with the natural regeneration of trees. Further details about the transition of land-use on abandoned and underutilized *khet* and *bari* land in the study area is reported elsewhere (KC and Race 2020a). This is not a new trend in the middle hills of Nepal, with it observed and reported in the late-1980s (Carter and Gilmour 1989) and late-1990s (Garforth et al. 1999). The national forests inventory data also shows the forest area increased by 5.14% in the two decades between the National Forest Inventory (1987–1998) and the Forest Resource Assessment (FRA) (2010–2014) (Gautam et al. 2004; DFRS 2015).

There is ample evidence from Nepal and other parts of the world showing forest recovery in abandoned and underutilized farmland, consistent with the FTT (Romero-Calcerrada and Perry 2004; Grau and Aide 2007; Díaz et al. 2011; Volafík and Hédl 2013; Melendez-Pastor et al. 2014). The increased number of trees on private farmland in the middle hills suggests the rural agricultural landscape in this



region is in transition, gradually converting to forest—naturally regenerated and planted.

Unlike CFs, both land and forest/tree resources can be owned by individuals, as in the case of forests/trees growing on private farmland, yet owners must still obtain approval from the local forest office to harvest, use and sell trees and other forest products even if grown on private farmland. There are also government restrictions on growing high-value tree species on private land, such as champ (*Michelia champaka*), Sal (*Shorea robusta*), Satisal (*Dalbergai latifolia*) and Vijaysal (*Pterocarpus marsupium*). Such restrictions, including the cumbersome procedure for obtaining the required permits, have made farmers reluctant to invest much effort in establishing forests on private farmland (Amatya and Lamsal 2017; Aryal et al. 2020).

## Implications for Forest Management

Decreasing household dependency on forest products from CFs has affected the management of CFs in the study area. It was consistently reported across the three case study sites that CFUGs were now often unable to manage the CFs as prescribed in their operational plans. Indeed, in some years there had been no management activities, and overall there has been far less collection of forest products from CFs than in the past. This trend is most evident for CF blocks that are furthest from community settlements. Forest management activities are now less intensive and less frequent compared to the past and mostly limited to those areas where firewood or timber is collected in close proximity to communities.

Increased participation of elderly and women residents in forest management is a trend that follows out-migration, but these community members are generally less able to contribute to forest management as previously undertaken due to physical constraints and they have less available time. According to the ex-chairperson of a CF in Samivanjyan, about 25% of the elderly who participated in controlling forest fires returned home without providing any physical contribution as they were unable to keep up with others. Also, he added, it used to be easy to gather users for forest management activities and CF meetings, but this is becoming increasingly difficult.

In Hiletaksar, FGD participants reported that the CFUG intentionally allocates Saturdays or holidays as the days for forest management in an effort to achieve a higher rate of participation. The CFUG's secretary in Samivanjyan reported that no forest management activities were undertaken in the previous year in the distant forest blocks as no members collected any firewood or timber from these areas. In another block a few Sal trees were harvested which was only the forest management activity undertaken in that particular block. Some FGD participants across the three case study sites reported that the trees which should be removed from the forests have not been removed and that this is now affecting regeneration and forest health. Many reported that the forest now contains more invasive species, mature trees and bush, and is becoming less productive as a result of fewer forest management activities. However, this result may differ based on the geographical location and biophysical factors of the forest.

Research in Mexico and India has shown that out-migration undermines the effectiveness of local institutions' adaption at the community level through losses of able-bodied men and women in rural villages (Robson and Nayak 2010; Robson and Berkes 2011a). Our findings for the middle hills of Nepal are consistent with the experience in Mexico and India. Despite extensive forest recovery in abandoned or underutilized farmland, many researchers in different parts of the world have shown that the decline in land-use intensity may result in land degradation (Melendez-Pastor et al. 2014), wildfire (Lasanta et al. 2009), reduced biodiversity (Robson and Berkes 2011b) or the spread of invasive species (Prishchepov et al. 2013). Along with regeneration, the occurrence of invasive species and unwanted plants/bush following a reduction in forest management activities in the study area could lead to forest degradation. Other authors have argued that the lack of forest management activities in previously managed forests may negatively impact regeneration and ecosystem services on these forests (Oono et al. 2020). A similar trend was observed in other villages in the middle hills that have a similar socio-economic context to this study, where forest conditions have not improved (Fox 2016). This observation contrasts with the assumption by Grau and Aide (2007) that rural–urban migration stimulates ecosystem recovery and enhances local biodiversity. The incidence of forest fires and even illegal logging is likely to increase in the long run if the current scenario of depopulation, disinterest and reduced forest management, including less monitoring of CFs, continues.

Decreasing dependency on forest products and lack of other economic incentives from forests has reduced the interest of most households in CFs. The committee members of CFs also highlighted the decline in a sense of community following out-migration and not many young people being interested in CFs thus, the future of community forestry would be at risk if the current trend of disinterest continues. Most CF operational plans in the middle hills are focused on fulfilling the basic utilitarian needs for forest products. The increase in out-migration and changing socio-economic conditions in the middle hills region suggests it is time to change the overall focus of CF management to improving forest health and promoting products and values that are more relevant to the current context of rural communities.

Refocusing the purpose and management of CFs is likely to be key to revitalizing the interest of local communities in CFs. The commercialization of forest products from CFs (e.g. the additional value of *ku kath* in the case of middle hills) appears to have considerable potential to generate economic benefits and inspire active forest management by local communities. Active forest management is essential to maintaining the productivity and biodiversity of forests and arrest forest degradation over the long-term.

Programs that focus CF management on providing a range of ecosystem services and improved livelihood opportunities are likely to offer opportunities for repositioning CF to provide greater value to local communities. Programs that promote and support agroforestry, forest-based small enterprise (e.g. furniture construction), ecotourism and payments for ecosystem services (PES) that are tailored to the local context are likely to broaden the appeal of CF for rural communities. Such a change will require investment in building the capacity of CFUGs to manage CFs for purposes other than basic needs, and to identify markets and forge connecting

value chains (e.g. stronger links with urban communities). A shift in the focus and management of CFs is essential to reinvigorate local interests, increase economic benefits for rural communities and ensure active engagement of all users in CFUG decisions, including the involvement of users who no longer depend on CFs for forest products. Nepal's National Forestry Sector Strategy (2016–25) and Forest Policy (2018) include promoting enterprise and economic development, together with realizing the environmental benefits of forests. Whilst this is a proactive strategy by the government, it is not likely to be realized by CFs unless local communities are more deeply engaged and motivated by new development opportunities.

Rather than applying broad policies of forest management uniformly across the country, there is a need to develop forest management strategies that are adapted to the local socio-economic context and physiographic characteristics. This will require enabling policies and corresponding guidelines that favour enterprise development and the removal of barriers and perverse incentives that discourage active forest management.

## Conclusion

Understanding the dynamics and impacts of out-migration on changing land-use and socio-economic conditions is central to managing forests in the middle hills region of Nepal. Community forests continue to play an integral part of rural livelihoods in the middle hills, even though usage patterns are changing. This study found that the perception of forest values can change over time. The harvest of basic provisioning services (e.g. firewood, fodder) has declined markedly over the past two decades in the middle hills. Other values are emerging, such as those reflected in markets for ecosystem services and eco-tourism. This study shows that out-migration coupled with other socio-economic changes is influencing the scale and type of forest products used by local communities and consequently, their forest management. The dependency on CFs for daily needs has declined markedly compared to 20 years prior (since about 1998). Instead, many households are using forest products sourced from trees grown on their farmland. Forest management activities in CFs are becoming less intensive and infrequent especially on CF blocks that are furthest from community settlements, which some speculate may lead to forest degradation in the long-term. Also, the remaining elderly villagers are less able to contribute to active forest management due to their declining physical strength and need for forest products. Thus, the approved operational plans for CFs are becoming increasingly irrelevant to the livelihoods of rural communities. While the self-regenerating trees on abandoned and underutilized farmland in the middle hills are of little commercial value in the short-term, these may accrue benefits for native biodiversity over the longer term (Rudel et al. 2005).

This research found clear evidence that many farming families are moving away from active land-use, including a declining interest and participation in CFs—with their livelihoods de-coupling from traditional subsistence farming and CFs. It is time to reimagine the potential of community and trees/forests on private farmland to create a new paradigm, whereby the regenerating new forests are valued more

for commercial, biodiversity and environmental services than the erstwhile value of fuelwood and fodder. To make the community forestry relevant to the current context of rural communities and to promote forest health, it is time to transition the management of CFs beyond the basic utilitarian values of forest products (e.g. production of firewood and fodder), to include a wider array of products and services. A more diverse range of products and services, such as from agroforestry, forest-based small enterprises, payments for ecosystem services (e.g. REDD+) and ecotourism. Understanding the complex processes of out-migration, economic modernisation and rural development can inform strategic policies to better foster resilient livelihoods and the transition to sustainable landscapes in the middle hills region of Nepal.

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