Community Forestry in Nepal: A Review of Socioeconomic Contribution to Forest-Dependents in a Changing Climate

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ABSTRACT

Community forestry (CF) in Nepal has successfully revitalized the barren hills and improved the socioeconomic conditions of communities that depend on forests. However, a thorough review of its actual contribution to poverty reduction and its potential to mitigate the impacts of climate change remains lacking. To contribute to this statement, we reviewed and synthesized the literature from 1987 to 2023, focusing on Nepal's community forest management scenario and its contribution to the socioeconomic aspect of forest-dependent communities in a changing climate. This will aid in generating evidence regarding the extent to which CF contributes to the economic upliftment of forest users and how it should address the gaps in the CF's poverty reduction objective. This review aims to help policymakers and practitioners find ways to integrate climate change issues into community forest management. This paper is fully based on a literature review where articles and journals pertaining to the topic were searched, and websites such as Crossref, PubMed, Scopus, Web of Science and Google Scholar were used to access the documents. The review explains that CF substantially contributes to forest development, community development, and the socioeconomic change of forest-dependent communities in a changing climate. Nevertheless, the economic benefits, particularly the contribution to poverty reduction, have not met expectations yet. However, we should not undermine its potential to reduce poverty. Thus, focusing on the context-specific policy should be a priority.

Keywords: *Adaptation and mitigation, climatic hazards, participatory forestry, poverty reduction*

INTRODUCTION

Nepal has a diverse climate ranging from tropical in the south to alpine in the north (NCVST, 2009) and nourishes plenty of rich biodiversity. Nepal's economy is highly dependent on using its natural resources, a significant portion of which is in the agrarian sector (CBS, 2011). Despite its small size, of which 5.96 million ha is a forest or 40.36% of the country's total area (DFRS, 2015), the forest is a prime component of rural livelihoods in Nepal; about 76% of the nation's population has been recognized as forest-dependent (Amatya, 2013), where 51.01% totally relied on fuelwood as a major source for cooking and heating (CBS 2023). Most of these

people who live close to the forest and whose subsistence livelihoods are in part derived from forests are considered to be forest-dependent communities (Holvoet & Muys, 2004; Fauchald *et al.*, 2009; Tieguhong & Nkamgnia, 2012; Amatya & Lamsal, 2017).

Nepal has always experienced environmental challenges due to various factors, including seismic activity, a variety of climatic conditions, weak geology, and high pressure on natural resources. Forest dependent communities experience these problems severely (Fisher *et al.*, 1997; Newtona *et al.*, 2016). Such communities have limited social access and economic opportunities and comprise poorer households that are primarily dependent on the forest to fulfil their forest-based subsistence needs (Acharya *et al.*, 1998; Timsina, 2002; Springate-Baginski *et al.*, 2003; Rasaily *et al.*, 2012; Chhetri, 2015; Tirivayi, 2015). Deforestation, forest degradation, and the effects of climate change further trigger the vulnerability of forest-dependent communities, although the extent of these impacts remains undefined (FAO, 2017). There is a risk that the poverty of forest-dependent communities can further accelerate the overexploitation of forest resources, resulting in increased shocks (environmental, socioeconomic, or both), aggravating poverty (Xie, 2017), emphasizing on how poverty in forest-dependent communities as an economic issue is more than just; it is inseparable from political and social power dynamics. Overexploitation of the forest resources, in turn, worsens environmental deterioration and increases susceptibility to shocks like resource shortages or natural disasters, resulting in a vicious cycle. Hence, how unequal power relations and economic disparities shape environmental outcomes, particularly in marginalized communities in CF, has been less explored yet.

The participatory resource conservation model is a prominent strategy contributing to community livelihood and forest conservation in Nepal. In the late 1970s, Nepal initiated a new participatory forestry model known as Community Forestry (CF) to address the livelihood issues of a poor and marginalized communities by conserving the degraded forest land (Bhattarai, 2016). Therefore, this strategy has been widely recognized as a successful forest management model (Agrawal *et al.*, 2001; Pokharel, 2012). Despite CF's success in conserving Nepal's forest, several factors hinder it. The global impacts of climate change are immense, particularly in areas facing environmental degradation, acute natural resource scarcity, and poverty (Mares, 2016). There are emerging concerns that climate change is decreasing the availability and quality of natural resources while increasing the poor's reliance on them. The major climate change problems identified in Nepal include the changing pattern

of monsoon rains, decreased winter rains, drying up of water resources, and increased incidences of pests and diseases, all of which have a direct impact on people's lives. Furthermore, the detrimental effects of climate change led to natural disasters that impair land and forest productivity (Banholzer *et al.*, 2014), particularly affecting those who depend on forests. This has become the primary hindrance to the CF's effective functioning in Nepal.

The paper is primarily based on a review and synthesis of the literature, focusing on Nepal's community forest management scenario and its contribution to the socioeconomic aspect of forest-dependent communities in a changing context. It attempts to review the contribution of CF to the socioeconomic of forest-dependent communities. It will contribute to the generation of evidence regarding the extent to which CF contributes to the economic sustainability of forest-dependent, as well as the ways in which CF should address the gaps in its poverty reduction objective. Many earlier research focused on either socioeconomic or environmental advantages, but rarely both. Bridging this gap helps us to explain why CF is important. Also, this review likely emphasizes how CF contributes to climate change adaptation, a relatively under-explored area in existing literature. Highlighting this adaptive function can help policymakers and practitioners design better climate-resilient strategies and incorporate these strategies into community forest management.

MATERIALS AND METHODS

A comprehensive review of the literature was done to identify literature exploring the socioeconomic benefits of CF to communities that depend on forests in the context of climate change. Articles and journals pertaining to the topic were searched using "Publish or Perish" software (Harzing, 2007). The websites used were Crossref (where 105 academic sources were found), PubMed (127), Scopus (37), Web of Science (16) and Google Scholar (87). Along these, Google (policy-related 11 searched), and previously related searched documents stored in the author's CPU (42) were also used while reviewing the literature. Altogether 425 related records were searched, where deducting the duplication, total number of unique searched was 138. The search terms and keywords that were used were "climate change," "Nepal," "South Asia," "community forestry," "socioeconomic contribution," and "forest-dependent communities." The search was restricted to publications released between 1987 and 2023. The earlier date was chosen to mark the beginning of the drafting of a Master Plan for Forestry Sector (MPFS), where the plan is considered a landmark for the decentralization and envisioning involvement of local communities in

forest management.

The inclusion criteria for the studies were as follows:

- Articles written in English language.
- CF-related national legislative documents, either published in Nepali or English language.
- Focused on initiatives related to CF
- Explored the socioeconomic outcomes of communities reliant on forests.
- Explored various aspects of climate change or strategies for adaptation.
- Empirical research articles encompass a range of study types, such as case studies, observational studies, and surveys.
- After using the criteria mentioned above, only 76 documents were finally reviewed in this study.

RESULTS

CF and socioeconomic aspects of forest-dependent

In CF, a community group takes control of a portion of the national forest to improve, protect, and use it for the community's collective benefit (GoN, 1993 & 1995). The program was officially launched in 1978 when legislation was enacted in Nepal (Kanel, 1993). Forest user groups are defined as the ultimate beneficiaries and managers of community forests. As self-governing institutions, Community Forest User Groups (CFUGs) have the legal authority to set their product prices and implement silvicultural and other forestry practices to manage their forests. In essence, CFUGs can allocate funds from the community forest income for the enhancement of their forests and support various social and community development initiatives (MFSC, 2013).

In Nepal, CF has been an exemplary forest management practice (Chhetri *et al.*, 2013). It has successfully conserved natural resources while fulfilling the daily forestry needs of the user groups. Additionally, it contributes towards local community development by directly utilizing the income generated by the CFUG. Nepal has designated 2490194ha (41% of the nation's national forest) as CFs. There are 23682 CFUGs (MoFE, 2023), with more than 2.9 million households engaged in forest management (Table 1). CF has also been playing an influential role in rural poverty alleviation in Nepal (Thoms, 2008) and in other Asian countries, including China (Xu *et al.*, 2004), Bhutan (Vollmar and Mas, 2012), and Vietnam and Laos (Sunderlin, 2006).

Table 1. *Forest management types and their status.*

Forest Management Types	Number	Area (ha)
Community Forest	23682	2490194
Collaborative Forest	31	75614
Leased-hold Forest (LHF)		
-Pro-poor LHF	7731	44398.74
-Commercial LHF	245	1443
Private Forest	2458	2360
Religious Forest	186	2896.57
Protected Forest (PF)	10	190809.43
-Proposed PF	6	137833.49
Protected Areas, including buffer zone	33	34419.75

Source (DOF, 2018; MoFE, 2023)

People who are dependent on forests are generally marginalized and excluded from the community due to factors such as poverty (Gautam *et al.*, 2020), elite control over forest resources (Gautam *et al.*, 2023), disadvantaged caste status (Gautam *et al.*, 2021), and inadequate societal structure (Tirivayi, 2015). Despite being the primary users and residing near the forest, forest dwellers often find themselves excluded from key forestry roles, such as management, access to various forest benefits, and overall decision-making (Xie *et al.*, 2017). As a result, their livelihoods are more vulnerable. Fisher (1997) and Newtona (2016) have defined forest-dependent communities as those whose livelihoods rely on forest resources, where they are living close to the forest, or where they have agrarian livelihoods and utilize the forest for income generation and supplementing consumption.

In most cases, the forest-dependent experience extreme poverty; hence, they require more forest resources to sustain their livelihoods (Hobley, 1987; Pandey, 1999; Oli *et al.*, 2016), motivating them to contribute more to conservation than any other community. These people utilize the forest for firewood, grasses, food, and other household needs, contributing to the overall uplift of their socioeconomic growth and status. As a result, people living in remote areas have undeveloped markets, deprived of road access and other basic facilities. They have limited access to employment, which exposes them to further risks and shocks. These people's vulnerability sources are environmental, economic, health, demographic, social, and political factors (Tirivayi, 2015). As per the work procedure for ecotourism promotion in community forests, CF can contribute to the socioeconomic

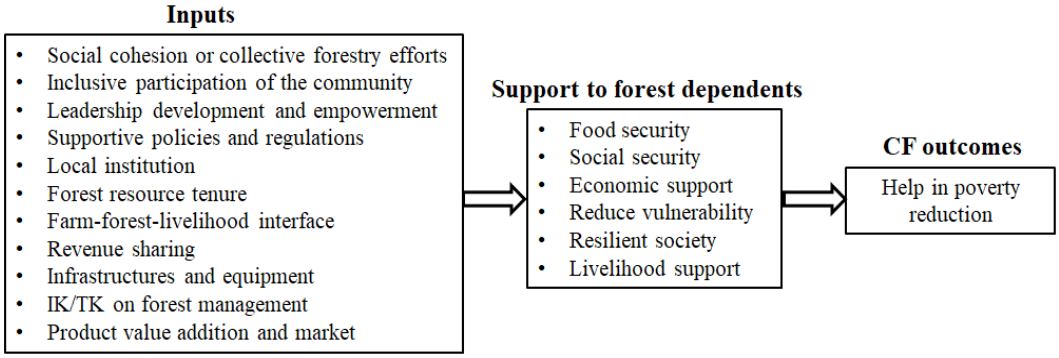

Figure 1: *Socioeconomic contribution of CF to forest-dependent*

aspect of the people through ecotourism (DoF, 2017), though it can negatively impact the natural resources if it is not appropriately managed. Hence, effective forest policy helps in the proper implementation of CF, which can improve community incomes and livelihoods, reduce poverty, and enhance food security (Tirivayi, 2015) (Figure 1).

In addition to the CF program, there are other forest management practices, e.g., leasehold, government-managed, religious and conservation forest management practices in Nepal, but CF is the top-priority forestry program. In contrast to other forestry practices, CF offers greater satisfaction to forest users regarding poverty reduction (Birch *et al.*, 2014). Pandey *et al.* (2016) state that CFUGs have raised forest carbon stock, enhancing people's livelihood, which will eventually help them adapt severe climate. However, CF mainstreaming excludes a marginal group of people (Gautam *et al.*, 2023), where they benefit less and bear more costs than wealth-off households (Sunam & McCarthy, 2010). Therefore, it has been a failure to fully utilize CF's role in reducing poverty.

Impact of climate change on forest and forest-dependent communities

Several factors affect livelihoods, including population growth, local settings, education level, social capital, income disparities, global environmental change, and the decreasing availability of resources (Kok *et al.*, 2010). People worldwide face an increased risk due to worsening environmental degradation. In particular, serious challenges include climate change and its impact on local people's social capacity, environment, and economic status. Climate change results in fluctuating weather patterns, affecting the intensity and distribution of precipitation, droughts, and other events (Mirza, 2003), and these conditions can trigger natural disasters (Helmer and Dorothea, 2006). Therefore, we should emphasize the impacts of climate change more effectively to guarantee sustainability for both current and future generations (Lindner *et al.*, 2008).

Climate change has affected various aspects of human society and ecosystems around the world. A rapid increase in Earth's temperature and changes in precipitation patterns directly impact multiple sectors of people's livelihoods. The most affected people in Nepal are the poor and vulnerable (CBS, 2017; Gautam *et al.*, 2021), who largely depend on natural resources for their livelihood. Researchers have found that the biggest threats to forests from climate change are fewer water sources, low soil moisture, new diseases in forest crops, and more invasive species (Table 2). These all affect the way of life of communities that depend on forests for their livelihoods.

Table 2: *Major links between extreme climatic events and forests.*

Effect	Climate variables	Impact	References
Habitat shift	Temperature: increase Precipitation: erratic	Changes in complex forest ecosystems and forest growth, disturb plants' ability to act as a carbon sink (temperature increases the length of the growing season, elevating the CO_2 level).	Backlund et al., 2008; Hember et al., 2016
Forest fire	Drought: increase Soil moisture: decrease	Changes biodiversity and species composition (drought can weaken trees and make a forest more susceptible to forest fire; such fire can make a forest more vulnerable to pests)	Backlund *et al.* 2008; Kurz *et al.* 2008; NRC, 2016
Species depletion	Drought: increase Precipitation: extreme Flooding: increase Snowmelt: increase	Biodiversity loss (influences seasonal availability of water; can even damage weather-resilient species)	USGCRP, 2009
Forest disease	Temperature: increase	Alter the seasonal life cycle of insects, expand their habitat ranges, loss of natural predators and pathogens (insect outbreaks often defoliate, weaken, and kill)	Backlund et al., 2008; USGCRP, 2009; NRC, 2016
Invasive species outbreaks	Temperature: increase	Declining native species (climate change could benefit invasive plants more than native)	Backlund e al., 2008; USGCRP, 2009

In addition to fulfilling the basic needs that forest provide to people, forests also play a vital role in global biogeochemical cycles that influence Earth's climate. Vegetation can alter an area's temperature and moisture availability by regulating soil moisture, lowering air temperature, and maintaining humidity. Therefore, there is a close relationship between vegetation and climate, and changes in one will inevitably impact changes in the other (Stephenson, 1990; FAO, 2013).

In Nepal, climate change has affected the livelihoods of low-income people, particularly in the remote mountainous areas, at unprecedented and devastating rates. Nepal is one of the most vulnerable countries in the world when it comes to experiencing the direct impact of climate change (CBS, 2017), which affects not only livelihoods but also the country's social and economic development.

Though developing countries like Nepal have contributed little to greenhouse gas emissions causing climate change, they experience more significant negative impacts than those most responsible for these emissions. This is due to their vulnerability from geographical exposure to climatic risks and poor adaptive capacity to withstand these impacts. Hence, the impacts of climate change on natural and social systems are always a vital equity issue (Schneider *et al.*, 2007; BK, 2010). Most people in remote areas depend heavily on forest products for their livelihood (Blomley & Iddi, 2009). Evidence shows that climate change is gradually impacting forests and their ecosystems. Therefore, any changes to forest resources will ultimately affect people's livelihoods.

Role of CF in climate change mitigation and adaptation

By providing regular ecosystem services, CF has also been a potential adaptation strategy to protect land and the people living on it from the negative impact of climate change. Forests present several opportunities for rural development and poverty alleviation, including income generation and employment options (Patosaari, 2007).

The CFUGs are the most suitable mechanism for protecting their resources and helping members enhance their adaptive capacity against adverse climate change effects. The most reliable way to help communities adapt to climate change is through these CFUGs, involve in conducting real vulnerability analysis, focus on the most vulnerable people in a society, use traditional knowledge to deal with effects, and connect adaptation strategies with communities' mitigation strategies and ability to adapt (BK, 2010), where CF contributes to climate change mitigation and adaptation (Figure 2).

In a case study, Bhusal (2009) identified several climatic hazards occurring

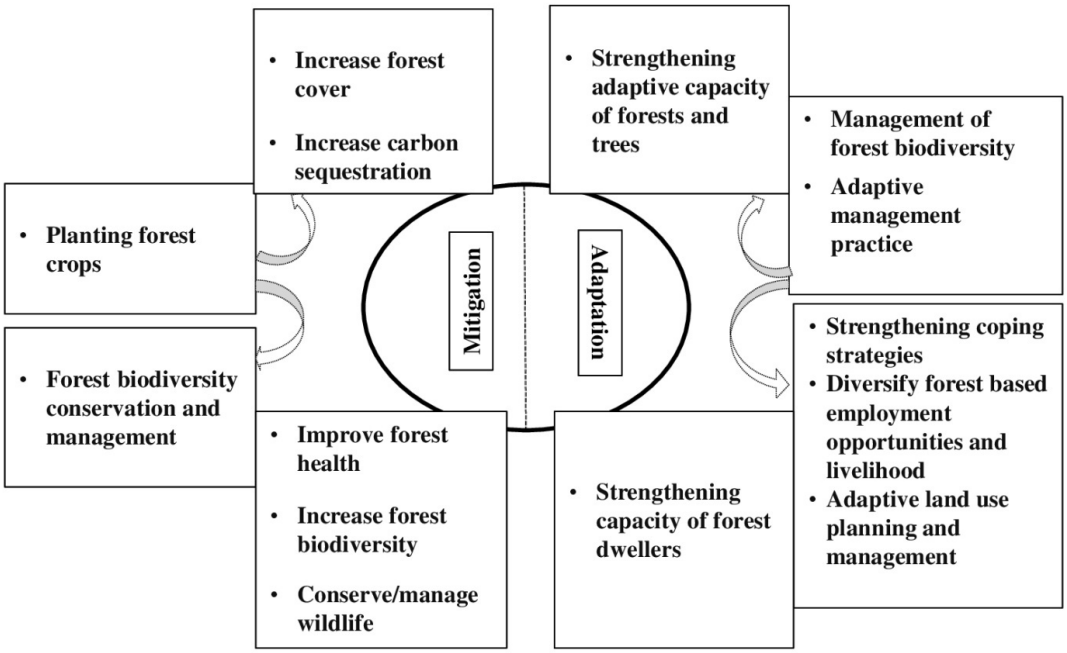

Figure 2: *Forest management approaches to climate change mitigation and adaptation. Modified from: CPF (2008)*

in Nepal, such as changes in rainfall patterns, more frequent droughts, abnormal hail, thunderstorms, relatively warmer wind flow patterns, and flowering and fruiting time shifts. Locals have been observing these changes for years and adapting to them through CF. NAST and OPML (2016) concluded that practitioners and community members' lack of skill and knowledge transfer on climate change led to several maladaptation practices. Such inadequacy in knowledge, skills, technological strength, and financial resources is a limiting factor in supporting and sustaining adaptation. That is why forest-dependent communities have faced various climate change adaptation challenges. Although CF has been playing a prominent role in climate change adaptation and mitigation, several limitations hinder adaptation practices (Table 3). A crucial function of CF in neutralizing the impact of climate change is to help in soil stabilization, reduce natural hazards, including erosion and landslides, and promote water conservation. However, Timilsina-Parajuli *et al.* (2014) found that forest-dependent communities are not well-informed about the critical role of community forests in reducing the impacts of climate change.

DISCUSSION

Since the introduction of participatory forestry in Nepal, most Global South countries have introduced the community-based forest management

model and are interested in the social and economic changes that forests have brought about, particularly for poor and vulnerable groups. We contributed to the search for clarity by reviewing the literature exploring the role of community forests in socioeconomic change at the community level and reducing poverty and climate change impact. CF has been Nepal's primary community-based forest management model, creating a history that spans more than 45 years. CF is a successful program that fosters collective action

Table 3: *Strengths and limitations of Nepal's CF for climate change adaptation and mitigation.*

Areas	Strengths	Limitations
Coverage	• One of the largest-scale coverage of civil society organizations in Nepal. • National-wide coverage (all seven provinces, 77 districts) and rooted in rural areas where adaptation needs are higher. • 35% of the country's population and over 60% of households in rural areas.	• Access to CF resources and benefits to distant users is limited. • Unequal distribution of CF in all provinces and geographical areas- limited in high hills and plain areas. • Equitable distribution of CF benefits to the poor, FDP has been criticized and challenged • It is criticized that elite CF members dominate the overall process of CFUG.
Right and ownership	• Forest Act 2019 provides full rights to the community to decide on all forest management activities, benefit-sharing, and other decisions as per CFUGs' needs and interests. Users have *de facto* rights.	• CFUG has no land ownership (*de jure*). If they sold the forest products to outsiders, they would have to pay taxes to the government. That's why this is not a full-fledged autonomous institution.
Benefit-sharing mechanism	• 100% with the community (out of total income, 25% forest protection and development, 35% pro-poor IGA, 40% others).	• Elite dominance, in most of the cases.

Livelihood assets	• Natural assets: Successful in rejuvenating denuded hills, farm forest livestock interface, climate regulation, and environmental services. Land allocation to pro-poor for improving household income. • Financial assets: Supply of direct forest products, forest-based income, IGA, ecotourism, and direct contribution to local poor as well as national income. CF fund as a ''safety net'' for the poor. • Human assets: Mobilize a large amount of CFUG funds for community welfare and development to support human resource development (contribute to schoolteacher salary, IGA, scholarship for poor children, skilled-based training), which have been enabling to minimize the youth emigration trend. 21 million households are directly involved in the CF program. • Physical assets: In some cases, CFUGs have their office buildings on their land, offices, and facilities; CFUG funds contribute to constructing community infrastructure (such as road maintenance, trail improvement, drinking water, electrification, and school building). • Social assets: Strong group dynamics, community collective action in forest management, leadership development and empowerment, social and community development. Established practices of CFUG assembly, periodic meetings, and an election for executive members.	• Low-level participation of women and marginal users in the decision-making process of CFUG. • An inadequate amount of CF funds has been distributed for pro-poor activities. • In some cases, there are ineffective and inefficient executive committee members. Some of the committee members and elite users do corruption and misuse of resources. • Insufficient orientation and motivation towards the subsistence needs of users. • Ignorance of climate change and adaptation.

Source: *Pokharel and Byrne (2009); Giri and Darnhofer (2010); DoF (2011); DoF (2018)*

in forest management (Adhikari *et al.*, 2007), and it contributes to poverty reduction by providing forest benefits to forest-dependent communities (Chhetri *et al.*, 2012). It is an autonomous practice that encourages people to conserve natural resources by providing them with various socioeconomic opportunities. It has fulfilled the dual objective of providing forest protection and livelihood support to forest-dependent communities (Pokharel *et al.*, 2007).

CF has successfully met the community's basic forest product needs, but its actual social and economic contribution on a larger scale remains poorly documented and quantified. We expect the community-managed forests to contribute more to poverty reduction than the government-managed forest (Acharya & Acharya, 2007; Malla, 2009). Similarly, a reasonable nexus exists between community forest, community livelihood, and poverty reduction (Pokharel *et al.*, 2007). Nevertheless, several factors influence CF's contribution to rural livelihood. In terms of social contribution, it has strengthened community cohesion, developed leadership skills and capacities for both men and women, empowered women and socially excluded groups, raised their social status, and promoted local collective action for community benefits. It has contributed to community development activities such as constructing roads, bridges, schools, community buildings, health services, drinking water facilities, irrigation canals, and electrification. However, there is constant debate about its contribution to poverty reduction (Devkota *et al.*, 2018). Forests are vital for poverty reduction in developing countries (FAO, 2010). However, several studies argue that CF has no expected results in terms of poverty reduction (Shrestha, 2016; Devkota *et al.*, 2018). Poor households benefit significantly less from CF than wealthier households (Chhetri *et al.*, 2012). The elites and wealthier households hold most of the vital positions, while the poor have a weak voice in decision-making. Devkota (2018) argues that the rules of equality in sharing costs and access to benefits have unexpectedly resulted in unfair outcomes, as poor and more vulnerable groups need more specific forest products than wealthier households. Similarly, protection-oriented forest management practices, which only allow limited harvesting of forest products and have not reached their full potential, have resulted in poor socioeconomic benefits for rural livelihood improvement and poverty reduction. Additionally, the traditional power and structure, which allow a handful of elites to occupy decision-making positions and make decisions in their interests, have led to a weak recognition of the needs and interests of poor people, women, and disadvantaged groups, resulting in a less significant contribution to their socioeconomic lives.

Climate change has multiple effects on rural communities and will affect poor and vulnerable groups whose livelihoods are largely dependent on natural resources. Community forests have various avenues to contribute to fighting climate change effects by sequestering carbon (Rijal *et al.*, 2022), conserving biodiversity, providing ecological services, minimizing deforestation, and increasing local resilience to climatic impacts (Shrestha *et al.*, 2010; Diswandi, 2022). Because it is a strong local participatory institution, it can develop collective action to mobilize resources and reduce vulnerability. It can include climate change adaptation activities in its operation plan and implement them to benefit all users, including women, poor, and vulnerable groups. Activities related to practicing agroforestry, planting climate-adapted species, training and educating communities to adapt to climate change, and diversifying livelihoods can strengthen forests and local communities' resilience to climate change, ensuring long-term forest management and livelihood security.

Our findings, which resonate with the work of Gentle & Thwaites (2018), explain that CF is relatively successful in reducing collective vulnerability. It has the potential to act as a strong local institution to reduce climate change vulnerability at the local level and ensure the participation of all community members in designing, implementing, and coordinating climate change activities. However, the findings suggest that the transformation of internal governance and the attitude of decision-makers are essential to strengthen it further. We found that CF has substantially contributed to forest developments, community development, and socioeconomic changes in forest-dependent communities. Nevertheless, the economic benefits, particularly the contribution to poverty reduction, have not met expectations yet. However, we should not underestimate its potential to reduce poverty.

This review adds to existing knowledge about CF's contribution to forest-dependent households' socioeconomic status in the context of climate change. It shows that the socioeconomic contribution of CF is substantial and that it has a key role in enhancing the resilience capacity of local forest-dependent communities in Nepal. Similarly, increased collective action through strong local CF institutions has been instrumental in accelerating the management and use of resources to reduce climate change impacts.

CONCLUSION

This review argues that there is much evidence that shows a meaningful contribution of CF to poverty reduction and its opportunities to help foster natural resource-based adaptation strategies. Communities in rural Nepal have found CF to be instrumental in supporting their livelihoods and enhancing their adaptive capacity. Despite CF's support for poverty-stricken individuals, its full

potential for poverty reduction remains untapped. Similarly, its contribution seems higher at the community than at the household level. This synthesis also highlighted elite capture in CF benefit-sharing, whereby relatively wealthier community members accrued more benefits than the poorer members. With the contribution of CF in addressing the climate change effect, CF institutions have enhanced communities' adaptive capacity to climate change by increasing people's knowledge, skills, and capacity around forest management and their socioeconomic assets. As an influential local institution, CF has enhanced social capital and triggered local collective action that provides a safety net against climate change. This review further revealed that the impact of climate change was similar to households of all strata, irrespective of their wealth and position in the community; however, a household with fewer resource alternatives experienced more significant shocks than a household with more resource alternatives. As a result, this group of households became more vulnerable to the effects of climate change. However, to fully realize the benefits of CF as a poverty reduction and climate change adaptation policy in Nepal, policy and practice must now focus on forest-dependent communities. Therefore, CF programs and activities must focus on increasing resource alternatives to reduce communities' vulnerabilities. We must transform community forest governance to ensure that poorer households actively participate in decision-making for forest management and benefit-sharing mechanisms.

FUNDING

This study was financially supported by Co-Innovation Centre for Soil and Water Conservation in Red Soil Region of the Cross-Straits (KP80ND803) and the Special Technology Innovation Foundation of Fujian Agriculture and Forestry University (KFB23051).

ACKNOWLEDGEMENT

We deeply acknowledge Dr Anil Shrestha (Faculty of University of British Columbia, Canada) and Prof. A. Singh for English proofing. We equally thank the anonymous reviewers whose comments enriched the paper.

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