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Contribution of Non-timber Forest Products to the Livelihood of Local people (A Case Study of Dadeldhura District, Nepal)

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Abstract

Non-timber forest products (NTFPs) are crucial for the economic stability and daily needs of rural communities in Nepal, offering resources like food, medicine, fiber, and construction materials. In the Dadeldhura district, NTFPs are integral to local livelihoods and traditional health practices. However, their sustainability is threatened by overharvesting and rising demand, highlighting the need for effective conservation strategies. This study examines the role of NTFPs in Nepal, utilizing a mixed-methods approach that includes structured household surveys and both qualitative and quantitative data analysis. The study reveals that 40.5% of the community earns between 25,000 to 50,000 annually, reflecting economic challenges and reliance on NTFPs. Additionally, 76.13% of collected NTFPs are primarily used for trade, underscoring their significant economic role. The findings suggest a need for improved market access, processing facilities, and community-based management to enhance the sustainability and economic benefits of NTFPs. This research offers valuable insights for local authorities, emphasizing the importance of targeted management efforts to ensure the continued availability and economic potential of NTFPs, ultimately benefiting the livelihoods of Nepal's rural populations.

***Keywords**:* non-timber forest products, sustainable management, rural livelihoods, economic resilience

Introduction

Non-timber forest products (NTFPs) are invaluable components of forest ecosystems, offering diverse provisioning services essential for the sustenance and economic resilience of rural

communities (MEA, 2005). Defined broadly as all biological materials other than timber derived from forests, these resources encompass a vast array of products used for food, medicine, fibre, and construction (Belcher et al., 2005). Globally, NTFPs are recognized not only for their contribution to rural livelihoods but also for their role in forest conservation and sustainable management (Shackleton et al., 2005).

Non-timber Forest Products (NTFPs) are vital components of rural livelihoods, offering significant income and food security benefits globally and locally. These products are particularly crucial in areas like Dadeldhura District, where they provide essential resources for income generation and subsistence living (Paloti & Hiremath, 2005; Sah et al., 2021). NTFPs are notably significant for marginalized groups, including women and the poor, who rely heavily on these resources for their economic empowerment and sustenance (Moloro & Abebe, 2022; Hazari et al. 2023). The commercialization of select NTFPs, such as wild coffee and honey, not only boosts local economies but also plays a key role in forest management and conservation efforts (Moloro & Abebe, 2022; Chilalo & Wiersum, 2011). Furthermore, the sustainable management and equitable distribution of NTFPs' benefits are supported by a network of stakeholders including local communities, industry, and government bodies. These stakeholders are pivotal in maintaining the viability of NTFPs as a sustainable livelihood source without compromising ecological health (Hazari et al., 2023; Johnson et al., 2013).

The value of Non-Timber Forest Products (NTFPs) for rural lives has been well-documented via a variety of studies, with a substantial focus on the economic and cultural contributions that these products make to communities that live in and around forests. Talukdar et al. (2021) did a study in the Patharia Hills Reserve Forest, which is located in the north eastern region of India. The study highlights the significant role that non-timber forest products (NTFPs) have in maintaining rural economies. These products encompass a diverse array of items, ranging from food, fodder, and fibre to traditional medicine and construction materials, all of which are intricately connected to the customs and traditions of the local community (Chopra, 1993; Gauraha, 1992; Mallik, 2000). Moreover, non-timber forest products (NTFPs) make a substantial contribution to the diets of rural inhabitants by supplying necessary nutrients, which change depending on the season (Sundriyal & Sundriyal, 2001). According to Sarmah et al. (2008) and Vedeld et al. (2007), the economic significance of non-timber forest products (NTFPs) is especially noteworthy in tropical developing nations. In these countries, a significant portion of the

population is dependent on these resources for their means of subsistence and primary health requirements.

Aside from the economic benefits, non-timber forest products (NTFPs) play a crucial part in the preservation of biodiversity and the resistance of climate change. (Heubes et al., 2012; Nkem et al., 2007; Paavola, 2008). They assist alleviate the detrimental consequences of climate change by giving alternative livelihood options under climatic pressures such as floods and droughts. This helps with mitigating the negative effects of climate change. Not only is the sustainable management of these resources essential for the reduction of poverty, but it is also essential for the preservation of ecological balance and the support of efforts for climate adaption.

In addition, the research conducted by Talukdar et al. (2021) sheds light on the difficulties that are connected to the extraction of non-timber forest products (NTFPs) in an unsustainable manner, which poses a risk to both the environment and the long-term viability of rural communities. In order to guarantee that the advantages of non-timber forest products (NTFPs) are realised without jeopardising the well-being of forest ecosystems, the authors call for the intervention of the government and the implementation of sustainable management techniques.

In countries like Nepal, with its rich biodiversity and varied ecosystems, NTFPs are particularly critical. They form the backbone of the economy in many rural areas, where communities are heavily reliant on these resources for their daily needs and cultural practise (Poudel, 2007; Gupta, 2015). Notably, NTFPs provide essential materials for traditional healthcare systems widely practiced in remote regions, where up to 90% of the population depends on plant-based medicines.

Despite their significant benefits, the sustainability of NTFPs is threatened by overharvesting driven by increasing market demand and population growth (Adhikari et al., 2004). This pressing issue highlights the need for effective management and policy strategies that ensure the conservation of these resources while still allowing for their economic exploitation (Belcher & Schreckenberg, 2007). As such, the balance between utilization and conservation is a critical area of study for ensuring the future availability of NTFPs.

In Nepal, the importance of NTFPs extends beyond subsistence; they are integral to the national economy through both direct use and export, notably to neighboring countries like India (Edwards, 1996). These products not only support household economies but also play a significant role in the cultural fabric of communities, often being used in traditional ceremonies and practices

(Wahlén, 2017). The ecological role of NTFPs cannot be overstated they contribute to biodiversity maintenance and ecosystem health, factors crucial in the face of climatic uncertainties and environmental degradation (Dash & Behera, 2016).

This research, located in Dadeldhura district of Nepal, aims to dissect the multifaceted roles of NTFPs in local livelihoods. It will explore how these resources support household economies against a backdrop of socio-economic transformations and shifting market conditions. The study will also examine the demographic and socio-economic factors influencing NTFP utilization, the structure of local and regional markets, and the impact of current management practices on sustainability by integrating these dimensions, the research intends to provide comprehensive insights into the potential of NTFPs as levers for rural development and forest conservation.

This study seeks to address several key questions: What are the primary types of NTFPs collected and used by local communities, how do NTFPs contribute to economic stability and subsistence, what demographic and socio-economic factors influence NTFP utilization, what are the current market structures and trade practices, how sustainable are current NTFP collection practices, what role do NTFPs play in traditional healthcare and cultural practices, and how do local governance and community-based management practices impact sustainable utilization? The significance of this research lies in its potential to illuminate the critical economic role of NTFPs, their cultural importance, and the necessity of sustainable management to ensure long-term availability. By addressing the research gap in comprehensive data on NTFP utilization, sustainability of practices, market dynamics, governance roles, and the integration of traditional and modern practices, this study aims to provide valuable insights for policymakers and local authorities, promoting strategies that balance economic use with conservation, thus supporting the livelihoods and ecological balance in rural Nepal.

Methods and Materials

The research was conducted in Dadeldhura district, located in the Sudurpaschim province of Nepal. This district spans an area of 1538 square kilometers and is characterized by a diverse range of vegetation from deciduous to coniferous forests, interspersed with grasslands and shrubs. With a population predominantly residing in rural areas, the district's community heavily relies on non-timber forest products (NTFPs) for subsistence and income. The extensive forest cover, accounting for 74.88% of the district's geographical area, alongside significant biotic and abiotic pressures, makes it a pertinent area for studying the sustainable management and development of

forest resources under community forest management programs.

The research adopts a mixed-methods approach, combining qualitative and quantitative techniques to comprehensively address the research objectives (Creswell & Plano Clark, 2017). This design allows for an in-depth exploration of how NTFPs contribute to local livelihoods and the sustainable development of forest resources. The use of both qualitative and quantitative data enhances the reliability and validity of the findings, as it allows for triangulation and cross-verification of data sources (Bryman, 2016).

Primary data were collected through structured household surveys, which gathered quantitative data from a stratified sample of the population, ensuring diverse representation across various demographic groups, including different traditional communities and caste groups within the district. The surveys were designed to capture detailed information on the types and quantities of NTFPs collected, their uses, and the economic contributions to households.

A multi-stage sampling technique was employed, chosen for its extensive forest coverage and the prevalence of traditional occupations that rely on non-timber forest products (NTFPs). The sampling process included all seven local units within the district to ensure diverse geographical representation. The sample size was determined by the number of households actively engaged in NTFP collection, using purposive and stratified sampling methods to achieve comprehensive coverage. The allocation of samples was proportionately distributed across local units and caste groups, employing systematic sampling techniques to select households for participation in the survey. This methodological approach ensures that the sample is representative of the population and that the findings can be generalized across the community.

Data gathered from multiple sources for this research were processed and analyzed meticulously to address the study's research questions effectively. Quantitative data derived from household surveys were analyzed using the statistical tool Excel version 16.84 to evaluate the economic impacts of NTFP utilization across different demographic groups and their contribution to livelihoods. Qualitative data were analyzed using thematic analysis to identify recurring patterns and themes related to NTFP utilization and management practices.

Results and Discussion

The demographic profile largely composed of young, educated individuals predominantly engaged in NTFP collection activities. A majority are unmarried (53.6%) and female (47.7%), with a significant portion between the ages of 15 and 35 years, encompassing both the late teenage years

and early adulthood. Educationally, most respondents have attained secondary education (50.9%), suggesting a population with a reasonable level of formal education. However, the yearly income data indicate economic challenges, as a majority earn between 25 to 50 thousand (40.5%), pointing towards a lower-middle-income bracket.

Table: 1 Demographic Information of Study Area

Variables	Components	No. of Respondents	Percentage
Marital Status	a. Unmarried	72	32.4
	b. Married	31	14.0
	C. both	119	53.6
	Total	222	100.0
Sex	a. Male	37	16.7
	b. Female	106	47.7
	c. both	79	35.6
	Total	222	100.0
Age	a. 12 to 15 years	4	1.8
	b. 15 to 20 years	70	31.5
	c. 20 to 25 years	63	28.4
	d. 25 to 35 years	67	30.2
	e. 35 to 50 years	17	7.7
	f. more than 50 years	1	.5
	Total	222	100.0
Education		1	.5
	a. Primary	79	35.6
	b. Secondary	113	50.9
	C. Higher Education	29	13.1
	Total	222	100.0
Yearly Income	a. less than 25 thousand	69	31.1
	b. 25 to 50 thousand	90	40.5
	c. 50 to 100 thousand	42	18.9
	d. 100 to 200 thousand	12	5.4
	e. more than 200 thousand	9	4.1
	Total	222	100.0

The collection patterns of various non-timber forest products (NTFPs) among surveyed individuals show significant variation. For "Rato Chyau," a notable 91.9% of respondents reported not collecting any, while 7.2% collected between 5 to 10 kg, and a mere 0.9% gathered more than 10 kg. Amala (*Phyllanthus emblica*) presented a more balanced collection pattern, with 39.2% not collecting at all and an equal percentage gathering between 100 to 200 kg, indicating a considerable level of involvement. In contrast, Ritha (*Sapindus mukorossi*) saw substantial engagement, with 43.7% of people collecting under 50 kg and 22.5% collecting between 50 to 100 kg, highlighting its common use.

Dalchini patta (*Cinnamomum tamala*) had a high non-collection rate at 86%, with only 10.4% collecting between 10 to 20 kg. "Jhyou Lichen Spcs." had an even higher non-collector percentage at 95.5%, suggesting limited use among the community. Timur (*Zanthoxylum armatum*) was also predominantly uncollected by 81.1% of individuals, with 16.7% collecting less than 5 kg. Both "Pasanbed (*Bergenia ciliate*) and Chutro bark (*Derberia asiatica*) showed high non-collection rates of 90.1% and 88.7%, respectively, indicating minimal interaction with these NTFPs.

Satuwa (*Paris polyphylla*) displayed a similar trend with 91.0% not collecting and only 6.8% collecting up to 10 kg. Sugandhawal (*Valeriana wallichii*) followed this pattern with 89.6% not collecting and a small fraction gathering more than 5 kg (2.7%). Lastly, "wild yam (*Dioscorea* spcs.) demonstrated that 94.6% of respondents do not collect it, with only 3.6% collecting over 20 kg, indicating very limited harvesting activities among the surveyed population.

While certain NTFPs have a higher active collection rate, a significant portion of the population surveyed does not engage in the collection of these forest products. This might suggest either a lack of dependency on these products, presence of alternative livelihoods, or potential issues related to access or sustainability.

Kafal (*Myrica esculenta*): A majority (68.9%) of the people surveyed do not collect Kafal. A small portion collects less than 1000 rupees worth of product, and an even smaller percentage collects within the 1000 to 5000 rupees range. Notably, 16.2% of people collect between 5000 to 10000 rupees worth of Kafal, indicating some level of commercial activity.

Wild vegetable: More than half of the respondents (58.1%) reported no collection of wild vegetables, suggesting a significant portion of the community may not rely on wild vegetables for subsistence or income. Those who do collect primarily fall within the 1000-5000 rupees range,

indicating moderate economic importance. Very few collect amounts over 5000 rupees, and only 0.5% of people collected more than 10000 rupees worth.

Wild Mushroom: A large number of people (66.7%) do not engage in wild mushroom collection. Of those who do, the most significant proportion collects mushrooms valued between 1000 to 2500 rupees, suggesting a level of dependency on this NTFP for either consumption or income. The collection amounts are considerably less for the other monetary ranges.

Chiraito (*Swertia chirayita*): Almost the entire population surveyed (96.4%) does not collect Chiraito. This could indicate a lack of access, demand, or knowledge about the collection and use of Chiraito, or perhaps it's due to strict regulatory controls or conservation concerns. A very small minority collects Chiraito that is valued between 1000 to over 2000 rupees, indicating that while collection is not common, there is a small market for those who do engage in its collection.

For "Nigalo," the clear majority of the surveyed individuals, 81.5%, reported no collection activity at all. This could indicate that "Nigalo" is either not abundant, not economically viable, or culturally not significant for the majority of the population. Meanwhile, 7.7% of the individuals collect a modest amount of less than 12 bhari per year, and the same percentage is seen for those collecting between 12 to 24 bhari annually. Only 2.7% collect between 24 to 50 bhari, and a mere 0.5% of the respondents collect more than 50 bhari per year, suggesting that higher volume collection is rare and possibly limited to a small group of individuals who may specialize in this activity or have better access to "Nigalo" resources.

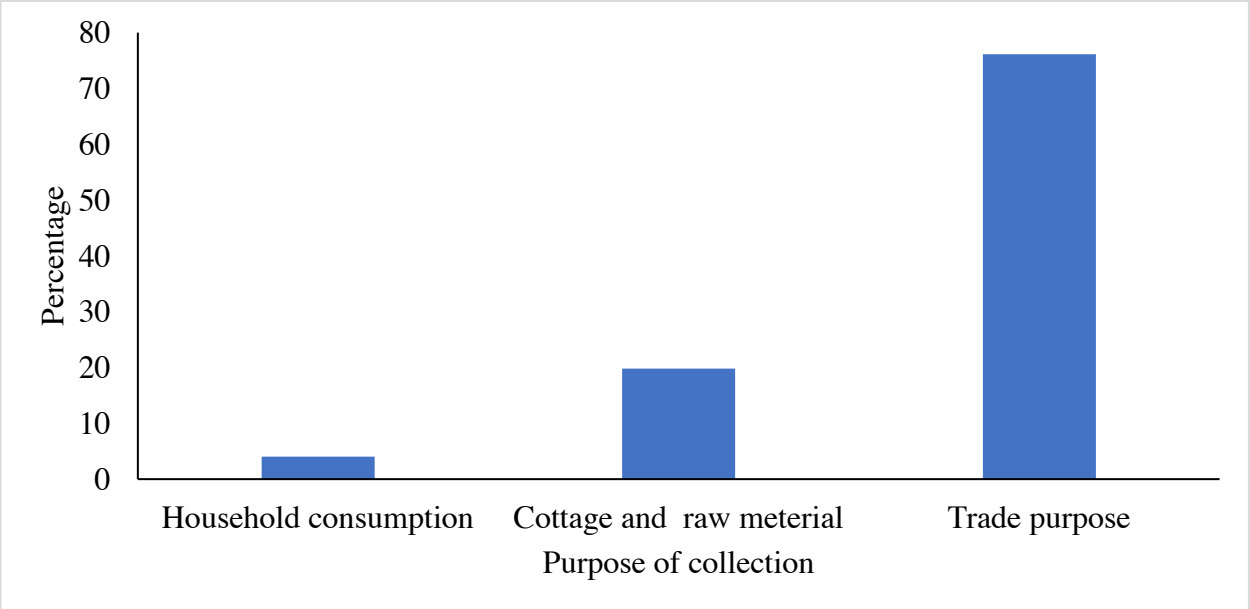
In the case of "Mutho Patero," 96.4% of the respondents not engaging in its collection. Those who do collect "Mutho Patero" gather only small quantities: 3.2% collect between 2 to 5 bhari per year, and just 0.5% of the individuals collect between 5 to 10 bhari annually. This pattern might reflect a low demand for "Mutho Patero," or it might highlight the possibility that it is used only for specific, possibly traditional purposes by a very limited segment of the community.

Table 2: List of NTPs found in the study area

Name of NTFPs (Local or Nepali name)	Scientific Name
Amala	*Phyllanthus emblica*
Chiraito	*Swertia chirayita*
Chutro bark	*Berberia asiatica*
Dalchini patta	*Cinnamomum tamala*
Jhayou	*Lichen Spcs*

Kafal	*Myrica esculenta*
Nigalo	*Drepanostachyum falcatum*
Passanbed	*Bergenia ciliata*
Rato Chyau	
Ritha	*Sapindus mukorossi*
Satuwa	*Paris polyphylla*
Sugandhawal	*Valeriana wallichii*
Timur	*Zanthoxylum armatum*
Wild Mushroom	
Wild Vegetables	
Wild Yam	*Dioscorea sps,*

Figure 2: Purpose of collection of NTFPS



Household Consumption: A small fraction, approximately 4.05%, of NTFPs collected are for household consumption. This suggests that the local community utilizes a minor share of NTFPs directly for their sustenance or personal use.

Cottage and Raw Material: Nearly 19.82% of the collected NTFPs are used as cottage industry inputs and raw materials. This indicates that a notable proportion of these products are possibly utilized for small-scale manufacturing or crafts, which can be a significant contributor to local

livelihoods and the economy.

Trade Purpose: The vast majority, about 76.13%, of NTFPs are collected for the purpose of trade. This demonstrates a high level of commercial activity and indicates that the trade of NTFPs is likely a vital component of the economic framework in the study area. The substantial percentage of trade-related collection suggests that there is a significant market, either local or broader, for these forest products and that they may be an important source of income for the community.

Overall, the data implies that while NTFPs play a role in household and cottage industry use, their primary importance economically is tied to trade, which underscores the potential for sustainable management and development initiatives within the NTFP sector.

Results and Discussion

Non-timber Forest Products (NTFPs) play a pivotal role in the economic stability and subsistence of rural households in Dadeldhura District. A significant portion of the community relies on NTFPs for their annual income, reflecting the economic challenges faced by these households. This finding aligns with previous research indicating the vital role of NTFPs in rural economies (Dhakal et al., 2018; Maharjan & Dangal, 2020). The primary use of collected NTFPs for trade underscores their economic significance, reflecting the broader trend where commercialization of NTFPs contributes to local and national economies (Marshall et al., 2003). The substantial engagement in NTFP trade indicates a robust market demand and highlights the potential for economic growth through sustainable management and improved market access (Belcher & Schreckenberg, 2007).

There was varied collection patterns among different NTFPs, reflecting their diverse uses and economic value. For instance, Amala (Phyllanthus emblica) and Ritha (Sapindus mukorossi) show substantial engagement in collection, highlighting their economic importance. In contrast, NTFPs like "Jhyou Lichen Spcs." and "Wild Yam (Dioscorea spcs.)" had high non-collection rates, suggesting limited use or potential sustainability issues. These findings align with previous studies highlighting the need for sustainable harvesting practices to prevent overexploitation and ensure long-term availability of valuable NTFPs (Belcher et al., 2005; Heubes et al., 2012).

A high level of commercial activity in NTFP trade was observed, with a significant market orientation reflecting the economic reliance on NTFPs and underscoring the need for improved market structures and access. Enhanced market access, coupled with better processing facilities, can increase the economic returns from NTFPs and support rural livelihoods (Edwards, 1996).

Additionally, the development of community-based enterprises can create local employment opportunities and foster economic resilience (Dhakal et al., 2018).

NTFPs are not only economically significant but also culturally vital, providing essential materials for traditional healthcare and cultural practices. Up to 90% of the rural population depends on plant-based medicines derived from NTFPs, emphasizing their role in traditional healthcare systems (Poudel, 2007; Gupta, 2015). This cultural importance highlights the need to preserve traditional knowledge and practices while integrating them with modern sustainable management strategies (Johnson et al., 2013).

The study emphasizes the role of local governance and community-based management in the sustainable utilization of NTFPs. Effective management practices and policies are crucial to balance conservation efforts with economic exploitation, ensuring the long-term sustainability of NTFP resources (Shackleton et al., 2005; Nkem et al., 2007). Community involvement in resource management can enhance the effectiveness of conservation strategies and promote equitable distribution of benefits. This approach aligns with the principles of participatory forestry, where local communities play a central role in managing and benefiting from forest resources (Lamichhane et al., 2021).

Despite the critical role of NTFPs, their sustainability is threatened by overharvesting and increasing demand. The study highlights the urgent need for effective management and conservation strategies to ensure the continued availability of NTFPs. Recommendations include developing better market infrastructure and access to enhance economic returns from NTFPs, implementing and promoting sustainable harvesting practices to prevent overexploitation, strengthening community-based management systems to enhance sustainable use and conservation, integrating traditional knowledge with modern sustainable management practices to optimize resource use, and focusing on supportive policies that balance conservation needs with economic utilization (Belcher & Schreckenberg, 2007).

Conclusion

This study underscores the significant role of non-timber forest products (NTFPs) in the Dadeldhura district of Nepal, emphasizing their importance for economic stability and subsistence in rural communities. Despite the critical role NTFPs play, their sustainability is threatened by overharvesting and increasing demand. The findings reveal varied collection patterns with a significant shift towards market-oriented trade, reflecting potential for economic growth. The

study's demographic data points to a young, educated population involved in NTFP collection, suggesting an opportunity to integrate traditional knowledge with modern practices for optimized resource use. This research highlights the necessity for enhanced market access, improved processing facilities, and community-based management strategies to ensure the sustainable utilization and conservation of NTFPs. Overall, this study provides vital insights that can aid policymakers and local authorities in crafting strategies that balance the conservation needs with the economic utilization of NTFPs, ensuring the sustainable management of these resources is crucial for maintaining ecological balance and supporting the livelihoods of Nepal's rural populations.

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