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Why is the Private Forest Program Stunted in Nepal?

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Abstract

Private forest (PF) program has the potential to be one of the most efficient forest management programs in Nepal but it has not gained the momentum compared to the other forest management regimes. Considering this, this paper aims to portray policy provisions, existing institutional arrangements as well as landholder experiences and perceptions over the existing mechanisms of PF registration, management, and forest product harvesting. Using the Sudoorpashchim province of Nepal as a case study, we conducted policy and literature reviews, key informant interviews, household surveys, and field observations. We found only 300 PFs registered in the Sudoorpashchim province, with lowland districts having the highest proportion (87%). Institutional arrangements and procedures for timber harvesting and selling were found to be lengthy and complex, with this being a major issue for PF owners with small forest areas. Government initiatives are inadequate to facilitate PF development due to poor implementation of policy provisions, as well as the lack of appropriate incentives and program packages. Despite a very small government investment in PF development, we found the return from PFs in terms of timber supply to be substantially higher than other forest management regimes. Among others, PF owners perceive the cumbersome regulatory procedures and lack of technical support to be the most pertinent factors responsible for the limited growth of PFs. Based on our results, we have discussed and recommended a number of policy and institutional measures to mainstream PF development programs, in order to support economic prosperity of the nation.

Keywords Private forests · Institutional arrangement · Policy awareness · Forest product harvesting · Timber supply

Introduction

Forest resource management practice is characterized by patterns of resource distribution, traditional and customary rights, and, to an extent, governing rules of the countries (Lescuyer 2013; Bhattarai 2017). Different countries are employing their best possible institutional arrangements for effective and sustainable forest management, ranging from individual farmers and community groups, to large scale government-managed forests (Gregersen et al. 2012; Robinson et al. 2014; Brandt et al. 2017; Gatto et al. 2019). Globally, privately owned forest increased from 13% to 19% of total forest area between 1990 and 2010. The highest proportion of privately owned forests is found in East Asia and Oceania (42%), followed by North America (33%) (FAO 2015). The highest increase in private forests (PFs) over the period of the last 25 years can be observed in upper middle-income countries; for example, 85 Mha of forests in China was added to PFs (FAO 2015), however, low-income countries, like Nepal, have limited coverage of private forestry.

With more than 44% of its total area occupied by forest resources, Nepal has been practicing various forest management models, broadly classified into three categories; (1) government-managed forests: solely managed by the government, (2) community managed forests: conserved, managed, and utilized by community user groups, and

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(3) PFs. PFs are defined as "a forest established, nurtured, or conserved by an individual in his/her privately owned land pursuant to prevailing laws" (GON 2019, p. 2), having both forest and land tenure rights on individual farmers. Conservation and development of forests on private land has been a traditional practice, being an essential part of farming systems and rural livelihoods in Nepal (Oli et al. 2015; Amatya and Lamsal 2017). PFs in Nepal can be found in various forms, such as trees outside forests, home gardens, agroforestry, and horticultural practice on privately owned lands (Webb and Dhakal 2011; Dhakal et al. 2012; Bhattarai 2014). However, the number of PFs is grossly underestimated in the national database (Subedi et al. 2014). Even though the PF program has been legally recognized and practiced for decades, it is among the least discussed forest management models in Nepal. For instance, the Master Plan for Forestry Sector (1989) had placed equal focus on both community and PF development as a part of the six primary development programs. To reflect on implementation afterwards, more than 22,000 community forests, engaging 2.9 million households, have been established that are managing about 40% of the total forest area of Nepal (DOF 2018). Registration of PF is limited to only 3753 private individuals, formally managing only 2902 ha of forest land (Amatya and Lamsal 2017; DOF 2018).

Although registered PFs constitute only about 0.05% of the total area of the country, a study by Oli et al. (2016) found that more than 20% of the national income of the forestry sector is from PFs. Another study by Amatya and Lamsal (2017) found that the share of timber supply from PF in the fiscal year 2015/2016 was more than 80% of the total timber supply in the national market. Similarly, Bhattarai (2014) claimed that about 50% of the national timber demand is supplied through PFs. Despite the huge potentials of PF to satisfy the national demand for timber and other forest products, the PF development program is constrained due to various institutional and practical issues.

A plethora of literature can be found about community-based forest management models in Nepal, but the research about PFs has very limited coverage. PFs are conceived as an important source of rural livelihoods in policy processes for decades, but there is a lack of integrated information about what the current policy ideas and provisions for PFs are, and why the policy provisions are inadequate or ineffective in practice for the development of PFs (Bhattarai 2014; Amatya and Lamsal 2017). Although informed about the low percentage of PF coverage at the national scale, policy makers, and scholars do not have explicit information about what is lacking in existing institutional arrangements and development programs for PFs. Moreover, the perception of PF owners about the policy, institutions, and programs related to PF development has rarely been documented in Nepal (Chhetri et al. 2017; Cedamon et al. 2018). In this context, we aim to analyze policies and practices for PFs in Nepal, and the reflection of PF owners through their experience and expectations for PF development. Referring to a case study of the Sudoorpashchim province of Nepal, we intend to portray policy provisions, current scenarios, existing institutional arrangements and landholder experiences and perceptions regarding PFs registration, management and forest product harvesting. Moreover, we intend to recommend the pathways for PF development to ensure sustainable forest management along with economic consideration of forest dependent communities. This paper is expected to inform policy makers and scholars about the major issues hindering the development and expansion of PF program in Nepal.

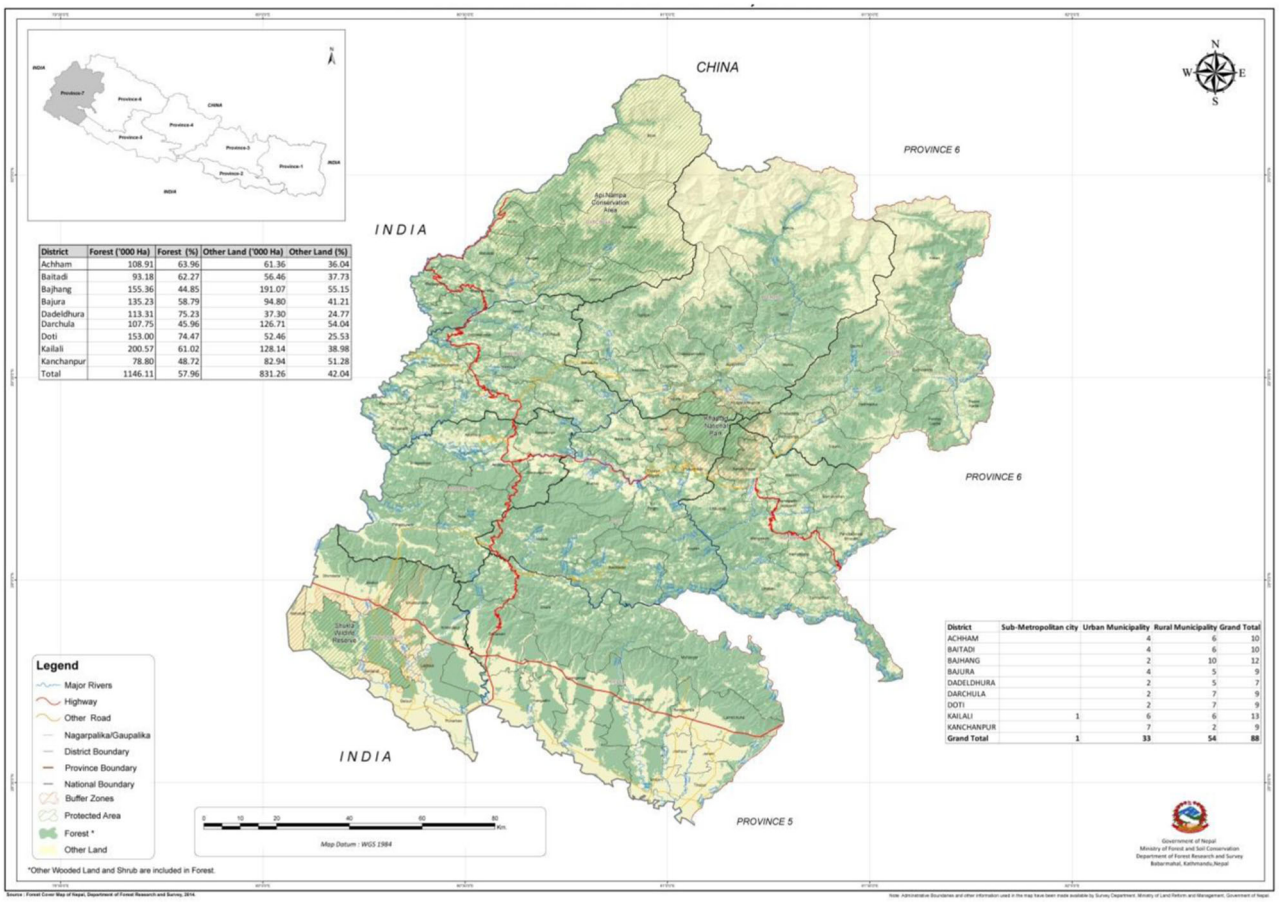
Methods

Study Area

The study was carried out in Sudoorpashchim province, one of the seven provinces of the Federal Republic of Nepal, lying in the western part of the country (Map 1). There are nine districts in the province, with a total area of 19,539 sq. km. Of the nine districts, two districts are located in lowland regions whilst the other seven districts in mountains and the Himalayan region. Forest land covers more than half (1,146,110 ha = 57.96%) of the total area of the province.

Data Collection and Analysis

Both qualitative and quantitative methods were employed for this research. Primary data were collected through key informant interviews, household surveys, and field observations from August to November 2019. Key informant interviews (KII, $N = 20$) were carried out to outline the major issues and challenges in the development of PFs, based on a predetermined checklist covering multiple aspects of private forestry. KII were carried out with provincial government officials working at the Divisional Forest Offices (DFOs) ($n = 8$), civil society actors ($n = 5$), representatives of PF networks ($n = 3$), and representatives of the local government ($n = 4$). Those stakeholders were selected because of their understanding of PF development processes in the Sudoorpashchim province. We adopted an inductive approach to determine the major themes related to PF underdevelopment in this province (Thomas 2006). We employed the inductive approach so as to investigate and group data and information collected through KII, which resulted in identification of major themes. From the interaction with KII, we found five major themes about issues and challenges in PF development in Nepal relating to; (1) regulatory processes, (2) opportunity cost of growing trees



District	Forest ('000 Ha)	Forest (%)	Other Land ('000 Ha)	Other Land (%)
Achham	108.91	63.96	61.36	36.04
Baitadi	93.18	62.27	56.46	37.73
Bajhang	155.36	44.85	191.07	55.15
Bajura	135.23	58.79	94.80	41.21
Dadeldhura	113.31	75.23	37.30	24.77
Darchula	107.75	45.96	126.71	54.04
Doti	153.00	74.47	52.46	25.53
Kailali	200.57	61.02	128.14	38.98
Kanchanpur	78.80	48.72	82.94	51.28
Total	1146.11	57.96	831.26	42.04

District	Sub-Metropolitan city	Urban Municipality	Rural Municipality	Grand Total
ACHHAM		4	6	10
BAITADI		4	6	10
BAJHANG		2	10	12
BAJURA		4	5	9
DADELDHURA		2	5	7
DARCHULA		2	7	9
DOTI		2	7	9
KAILALI	1	6	6	13
KANCHANPUR		7	2	9
Grand Total	1	33	54	88

Map 1 Study area (Sudoorpashchim province) showing the district-wise distribution of forest area (Source: DFRS 2015)

in farmlands, (3) technical aspect, (4) financial aspects, and (5) market factors. Those five themes were then further prioritized and analyzed through household survey. The checklist for KII and survey questionnaire is presented in a Supplementary file.

Household surveys were carried out with the owners of PFs in Sudoorpashchim province of Nepal. We broadly classified the nine districts into two categories based on the physiographical region and accessibility of the districts; (1) lowland districts: Kailali and Kanchanpur, and (2) hilly districts: Doti, Dadeldhura, Baitadi, Achham, Bajhang, Bajura, and Darchula. We then assessed the total registered PFs from registration records in the respective DFOs. Because of the lack of database of total unregistered PFs, all the owners of PF who took forest product harvesting permits from the respective DFOs in the fiscal year 2018/2019 were listed out. Afterwards, 25 PFs were selected through simple random sampling from each of the registered and unregistered PFs in both lowland and hilly districts (Table 1). Household survey was carried out based on the predetermined semi-structured questionnaire. For the priority ranking, PF owners were asked to rank the five major issues on a scale of 1 (for least priority) to 5 (for high priority). For data analysis, we used both quantitative and qualitative analytical methods. During quantitative data analysis, we calculated the weighted ranking value by dividing the cumulative value of each type of issue and challenge by total value each for registered and unregistered PF. For the qualitative analysis, we employed coding and categorization of thematic areas of research interests, and excerpted the themes to address our research questions. Moreover, field observation of the PFs was done simultaneously to understand forest conditions, and species distribution.

Table 1 Total number of PFs and sample size

Private forests	District category	
	Lowland districts	Hilly districts
Registered	Total: 266; sampled, 25	Total: 34; sampled, 25
Unregistered	Total: 873; sampled, 25	Total: 526; sampled, 25

Secondary data were collected through policy documents, the annual program budget of the government of Sudoorpashchim province, and records from the respective

DFOs. A list of harvested tree species was collected from all the districts, and the most common ten species with higher quantity of harvesting and supply in the fiscal year 2018/2019 were recorded from records of DFOs. National policies that are related to PF development were reviewed to understand the policy content in each historical milestone.

Results

Policies and Institutions of PFs Development in Nepal

Cultivation of trees in farmland has been the age-old practice in Nepal. The legacy of domestic plantation was believed start from the fourteenth century and the provision of planting trees on private land before felling of a mature tree became mandatory during the Rana Regime (Amatya and Lamsal 2017), and this was gradually institutionalized as a socio-cultural practice. Regulation of PF was intended to be initiated by the declaration of the PF Nationalization Act in 1957. Although the Act was introduced to prevent rampant deforestation and logging from large blocks of PFs, it became counterproductive because it placed limits on land holding and also further created a fear of losing a large block of plantation area of private land[1] (Basnet 1992; Laudari et al. 2019). After that, numerous efforts have been made to ease and facilitate PF development; however, practical implication and realization of the potentials of PFs for economic contribution has always been questioned[2]. The chronological development of policy and institutions for the development and regulation of PF is presented in Table 2. It shows the major provisions of each of the successive policy measures, though some provisions are repeatedly mentioned in policy milestones due of the lack of implementation in preceding policy measures.

The Forest Act 1961 had a provision for technical support, security, and facilitation in forest product harvesting, transportation, and marketing, with the National Forestry Plan 1976 also incorporating the concept of growing trees in private land, but these were barely implemented except in a few plantation programs in degraded lowland areas of Nepal (Nagendra et al. 2008). Forestry professionals consider the Master Plan for Forestry Sector 1989 as a comprehensive forestry plan[3], and it had prioritized community and private forestry as one of the primary objectives of Nepal's forestry. However, implementation of policies and programs were mostly concentrated in community forestry (CF) leaving private forestry in the shadows. In order to encourage the PF program, free seedling distribution was the only program that government initiated in the 1970s and has been continued till date[4]. A noticeable provision was made in 2015 with the amendments to the Forest Regulation 1995 that allowed PF owners to harvest and sell the selected 23 tree species from private land without getting through a complex harvesting permit. Still, this provision is not duly implemented in remote areas of the country. The real issues of private forestry, such as procedural hurdles, are still persistent in Nepal and no substantial procedural and program reform has been made, imposing further challenges in development and expansion of PF (Subedi et al. 2014; Oli et al. 2016; Amatya and Lamsal 2017).

Current Status of Private Forests

Sudoorpashchim province is one of the richest provinces of Nepal in terms of forest coverage and timber production. District wise, the total number of registered PFs in Sudoorpashchim province is presented in Fig. 1. A total of 300 PFs were registered in this province, with the Kanchanpur district being the highest in registering PFs ($n = 182$) and there was only one PF registered in Achham district until 2019. Out of the total registered PFs, more than 80% of them lied in lowland districts. Areal coverage of registered PFs was also very small, with an average of 0.73 ha per PF in Sudoorpashchim province (Fig. 2). Although there was a high difference in the number of registered PFs in lowland and hilly districts, the average area per PF is not substantially different, ranging from the minimum of 0.29 ha in Dadeldhura district to the maximum of 3 ha in Darchula district.

Major tree species found in the PFs differ from lowland districts to hilly districts. Mostly exotic and deciduous trees are found in lowland districts, whereas coniferous tree species are most common in hilly districts. Table 3 shows the ten most common tree species that are harvested and sold from PFs from lowlands and hilly districts of Sudoorpashchim province in the fiscal year 2018/2019. PFs are found to be established and managed through plantation in the lowland districts, whereas PF owners in the hilly districts seem to conserve and manage naturally grown indigenous tree species[5].

Though the number of registered PFs is small, timber harvesting and sales from PFs is substantial. In the last fiscal year (2018/2019), total timber harvested and sold from PFs is 224,644 cubic feet from all the nine districts (Fig. 3). Timber harvesting from PF was highest in Kanchanpur district (65,000 cubic feet) followed by Dadeldhura (54,359 cubic feet), Baitadi (45,636 cubic feet), and Achham (39,238 cubic feet).

[1] Interview, provincial government officials.
[2] Interview, provincial government officials and civil society actors.
[3] Interview, provincial government officials and civil society actors.
[4] Interview, provincial government officials.
[5] Interview, provincial government officials.

Table 2 Chronological development of policies and institutions for PFs in Nepal

SN	Milestones	Policy idea and provisions
1	Human justice approach note by King Jayasthiti Malla in 1379	• Development of forest in fallow lands; farmers had to grow trees in lands that is not cultivated for 5 years or more (Amatya and Lamsal 2017).
2	Land ownership and provision of PFs by Rana Prime Minister Juddha Shamsher in 1935	• Mandatory provision for plantation of trees in private land before felling a mature tree (Paudel and Bhattarai 2015).
3	Private Forest Nationalization Act, 1957	• Legally defined and recognized PFs; • Initiated restrictive approach to forest protection and reduce deforestation; • Defined the area limit of PF land (maximum of 1.3 ha in hilly and 3.4 ha in lowland region).
4	Forest Act, 1961	• Allowed individual's freedom for forest development and selling, including the establishment of forest garden; • Elaborated technical support, security, and facilitation for PF development; • Authorized administration and regulation of PF by Department of Forests.
5	National Forestry Plan, 1976	• Initiated project model for development of PFs/trees in lowlands of Nepal.
6	Master Plan for Forestry Sector, 1989	• Given first priority to community and PFs; • Provisioned land tax reduction for block plantation in private lands and incentives for nursery establishment and plantation; • Recognized various awareness and capacity building programs.
7	Forest Act, 1993	• Ensured individuals freedom for forest protection, development, and selling; • Allowed freedom to determine the selling price of forest products; • Provisioned PF registration by district forest officer.
8	Forest Regulation, 1995	• Elaborated the procedures for PF registration, timber harvesting, and sells • Differed procedural arrangement for timber harvesting and sells from registered and unregistered PFs • Ban in harvesting of certain species *Shorea Robusta, Acacia catechu, Michaelia champaka*, and *Juglans regia* from private land; though the ban on species is changing over the period of time through government circulars.
9	Guideline to provide incentives for private and institutional plantation, 2010	• Initiated one person one plantation program; • Envisioned employment generation through PF development; • Suggested the commercialization of PF produces; • Discussed about engaging PF owners in carbon trade.
10	Private Forest Development Directives, 2011	• Inclusion of nontimber forest products development in PFs; • Eased PF registration processes; • Provisioned the institutionalization of PF groups and networks at district, regional and national level; • Suggested list of suitable tree species (26 species each for lowlands and hills) for plantation in private lands.
11	Amendments to the Forest Regulation 1995 in 2015	• Enabling environment for Farmers' friendly PFs regulations; • Provisioned harvesting and selling of some selected tree species (23 species) without long process of getting prior approval (but needs product verification) from government authority.
12	Forest Policy, 2015	• Envisioned to increase timber supply from PFs; • Provisioning of technology support, loan and insurance for PF development; • Procedural simplification for timber harvesting, transportation and selling.
13	Forestry Sector Strategy 2016	• Establishing and networking of PF owners; • Simplifying the permit system for timber harvesting, transportation and marketing; • Suggested exemption of value added tax from PFs; • Recommended for value addition of PF products; • Aimed to extend PF over 200,000 ha by 2025.
14	National Forest Policy, 2019	• Provisioning of family forests; • Provisioning of subsidized loan for PF development; • Suggested the need of technology transfer and capacity building; • Further simplification of forest products harvesting and selling; • Envisioned green enterprises development through PFs.
15	Forest Act, 2019	• Provision of PF registration and transport permit (within the concerned municipal area) by local government; • Assurance of not nationalizing PF; • Freedom to determine price of forest product; • Provisioning of technical support to PF owners as per the request.

Institutional Arrangements and Program Support

In the absence of provincial laws of Sudoorpashchim province for forest regulation, Forest Act 2019 is the major legal document guiding conservation, management, and utilization of forest products from PFs. Subsequent regulations and directives (such as, Forest Regulation and Private Forest Development Directives) further clarify the processes of forest registration, harvesting, and sales of forest products from PFs. As per current practice, DFOs are the major authorized government institutions at the district level to register PFs for the monitoring and administration of forest products, harvesting, and sales. Although Forest Act 2019 has delegated the authority of PF registration to the local government, PFs are still registered by DFOs due to the lack of procedural clarity for registration in local government body[6]. In addition to DFOs, District office of Land Survey, District Land Revenue offices, and local governments are the supporting institutions for PF registration and forest

[6] Interview, provincial government officials and representatives of the local government.

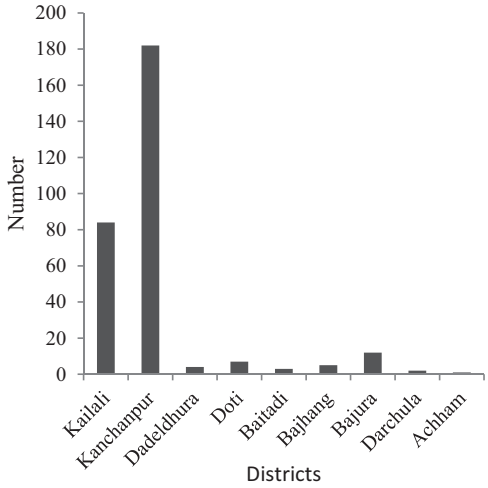


Fig. 1 Number of registered PFs in Sudoorpashchim province

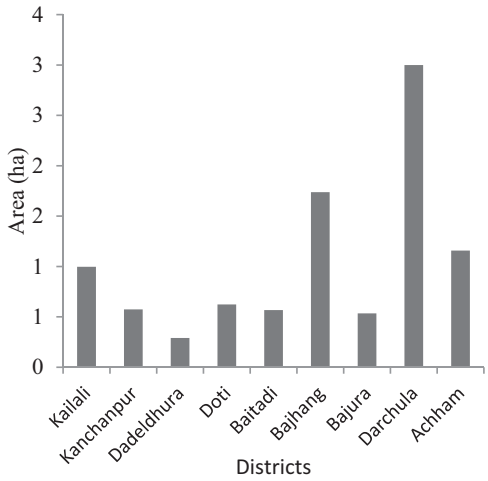


Fig. 2 Average area per registered PF, based on district-wise distribution

Table 3 Common tree species harvested and sold from PF

Districts	Tree species (scientific name)
Lowland districts	*Eucalyptus camaldulensis, Tectona grandis, Dalbergia sissoo, Pinus roxburghii, Acacia catechu, Bombax ceiba, Syzygium cumini, Mangifera indica, Melia azedarach, Artocarpus heterophyllus*
Hilly districts	*Pinus roxburghii, Toona ciliata, Diploknema butyracea, Alnus nepalensis, Pinus wallichiana, Sapindus mukorossi, Cedrus deodara, Quercus semecarpifolia, Cinnamomum verum, Bombax ceiba*

product supply. Forest entrepreneurs, furniture and sawmill industries, timber wholesalers and retailers are the market actors who are involved in harvesting and sales of forest products[7].

[7] Interview, representatives of the PF networks.

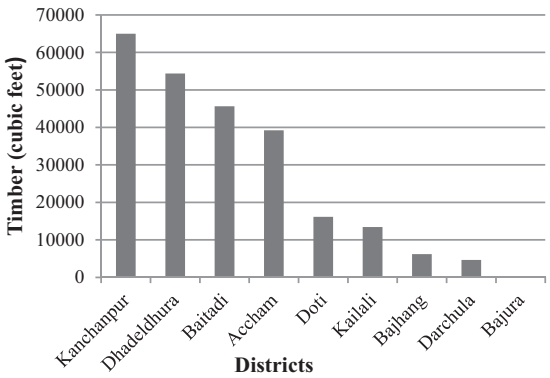


Fig. 3 District-wise quantity of total timber harvested and sold arising from PFs in the fiscal year 2018/2019

As per the legal provision, both registered and unregistered PF owners can manage, harvest and sell their forest products but the procedures of harvesting and selling are different. Figure 4 shows the procedure for forest product harvesting and sales from registered and unregistered PFs. Once the PF is registered, the owner of the PF can harvest and sell their forest products (except those species, which are banned by the government of Nepal, i.e., *Shorea robusta*) by providing an inventory report to the DFO (*lagat pramanit*)[8]. However, when initially registering the PFs, the owner must fulfill the procedural requirement from various government offices (land revenue office, office of the land survey, local government offices). In the case of unregistered PFs, the owners of the PFs have to come to the government offices and the local representatives for validation and verification of the forest products before harvesting to ensure that the products are from the land of the owner[9]. This tedious process should be followed for every instance of tree harvesting and felling by unregistered PF owners. In addition, officials from DFOs should follow through on investigations, field verification, and public hearing before giving harvesting permits to unregistered PFs owners. After getting permits from the government authority for harvesting and sales, PF owners have to go through negotiation and agreement with timber entrepreneurs for sales and marketing of the product[10]. However, in practice, the market actors (including middlemen and local brokers) facilitate all the procedures for getting permits for harvesting and transportation of forest products on behalf of the concerned PF owner. This results in low bargaining capacity of PF owners while determining the price of forest products, which is also a key challenge for PF development[11]. Generally, the procedural steps for PF owners end

[8] Interview, provincial government officials.
[9] Interview, representatives of PF network.
[10] Interview, representatives of PF network.
[11] Interview, representatives of the PF networks and civil society actors.

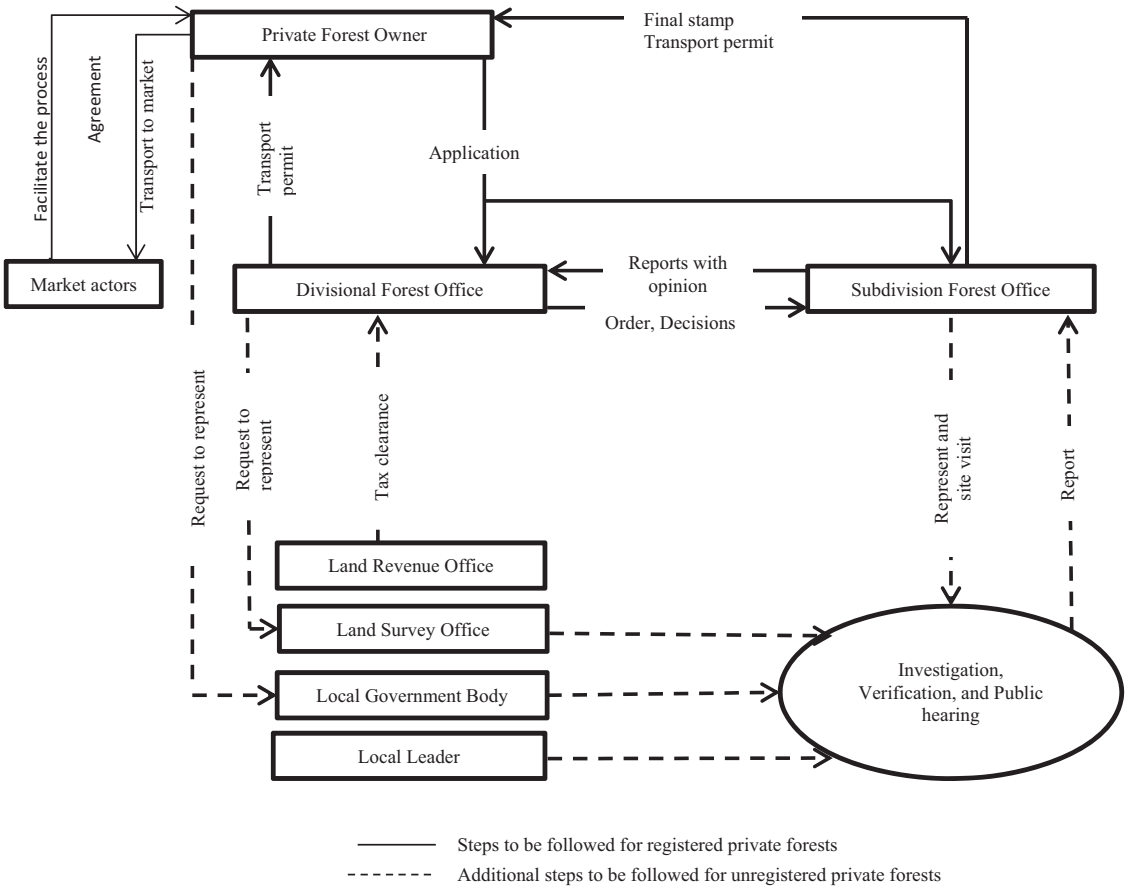


Fig. 4 Flowchart showing the steps/process of timber harvesting and sales from private forests

when the market actors buy the timber product and collect it from the felling areas.

The government of Sudoorpashchim province has implemented very few programs to support establishment and management of PFs. Regarding the target programs for PF development, only four core programs, with the investment of US$30,302, were implemented in the fiscal year 2018/2019 (Table 4). Although, the government has provisioned for support programs, these programs were not necessarily implemented in the PFs[12].

Landholders' Perception on PF Development

When owners of registered PFs ($N = 50$) were asked about their reasoning regarding registering PFs, most of the respondents, both from lowland and hilly districts, mentioned that they registered PFs to ease supply of forest products (Fig. 5). For example, 60% and 48% of the respondents from registered PFs in lowland and hilly districts, respectively, mentioned the main reason for registration was to harvest and sell forest products to the market easily. When compared to lowland districts, a relatively high percentage of owners of PFs (40%) from hilly district responded that they registered the PF with a hope to get government incentives. Only few respondents mentioned other reasons for registration such as to advance agroforestry practice, and with the hope to get involved in organizational networks of PF at district or national level. Similarly, most of the unregistered PF owners stated that lack of policy awareness (about benefits of registering PFs and the difference in policy provisions for registered and unregistered PFs) is the main reason for not registering their PF lands (Fig. 6).

Regarding the perceived easiness in forest product harvesting and sales, none of the unregistered PF owners found it easy (Fig. 7); however, 28% of the respondents from registered PFs mentioned that it was easier for harvesting and sales. In contrast, 70% of the respondents from unregistered PF owners indicated that it was very difficult for forest product harvesting and sales from the PFs. Regarding the time lapses for forest product harvesting and sales, Fig. 8 shows that unregistered PF owners have to spend

[12] Interview, provincial government officials.

Table 4 Annual programs and allocated budget for PF related programs in Sudoorpashchim province in fiscal year 2018/2019

SN	Programs/activities	Unit	Quantity	Annual budget (US$)	Remarks
1	PF management, enhancement, and expansion program	Number	10	5566	Core programs
2	Grant to establish private nursery	Number	21	8658	
3	Financial incentives to register PF (US$41—per registration)	Number	150	6184	
4	Grant to produce multi-year seedlings	Farmers	150	9894	
5	Plantation program	Hectare	56	46,174	Support programs
6	Agroforestry development and expansion	Number	30	82,454	
7	Agroforestry management program	Number	28	28,405	
8	Multi-year seedling production program	Number	365,000	27,622	
9	Greenery (Clean Environment Campaign) promotion program	Number	5	16,491	
Total				231,448	

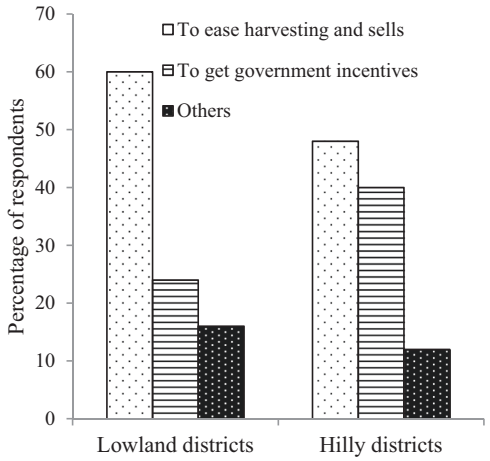


Fig. 5 Percentage of respondents from registered PF why they registered their forests

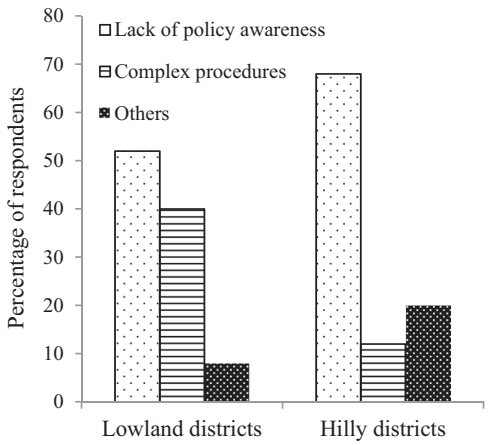


Fig. 6 Percentage of respondents from unregistered PF why they did not register their forests

more days than registered PF owners, from their application, to get a harvesting permit until it is transported to the market. On average, registered PF owners wait 22 days from application of harvesting to market gate, whereas unregistered PF owners spend an average of 35 days, with the maximum up to 60 days.

Among the five major issues and challenges of PF development in Sudoorpashchim province, we found that all the unregistered PF owners indicated cumbersome regulatory procedures as their most prioritized issues and challenges in PF development (Fig. 9). However, in the case of registered PFs, weighted value for the lack of technical support is highest, followed by opportunity cost. When compared to the unregistered PF owners, those registered gave high priority to opportunity cost incurred by growing trees/forests in private land. Both registered and

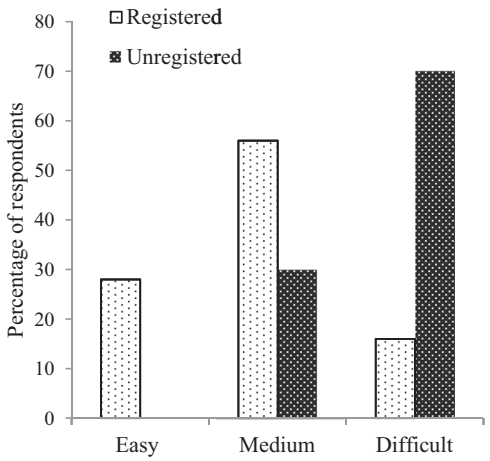


Fig. 7 Percentage of respondents rating the procedural requirement for timber harvesting and sales

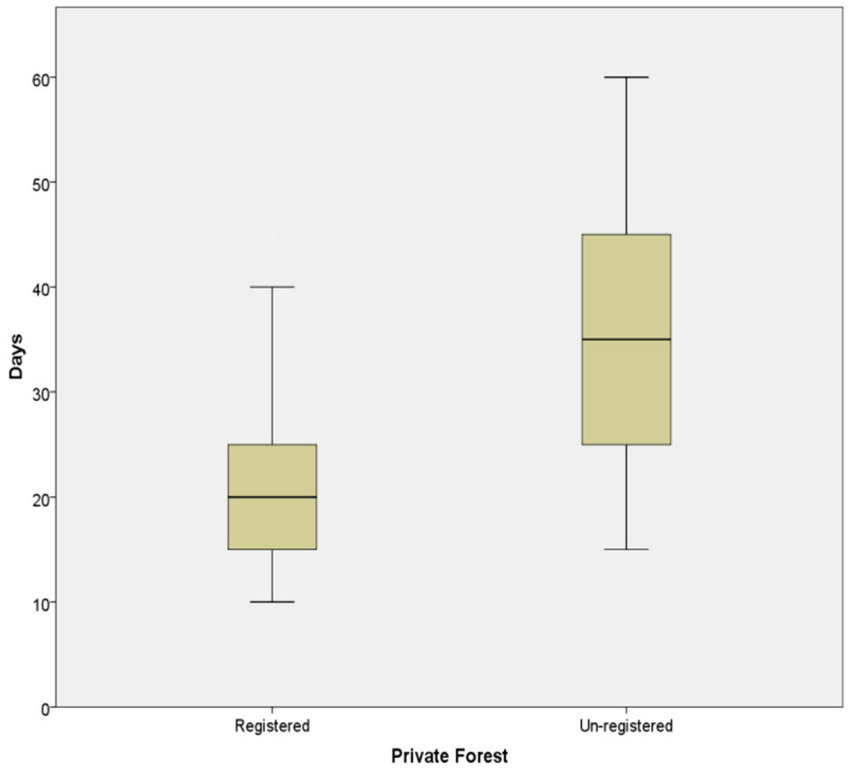


Fig. 8 Average number of days elapses for getting harvesting permit and transportation to the market

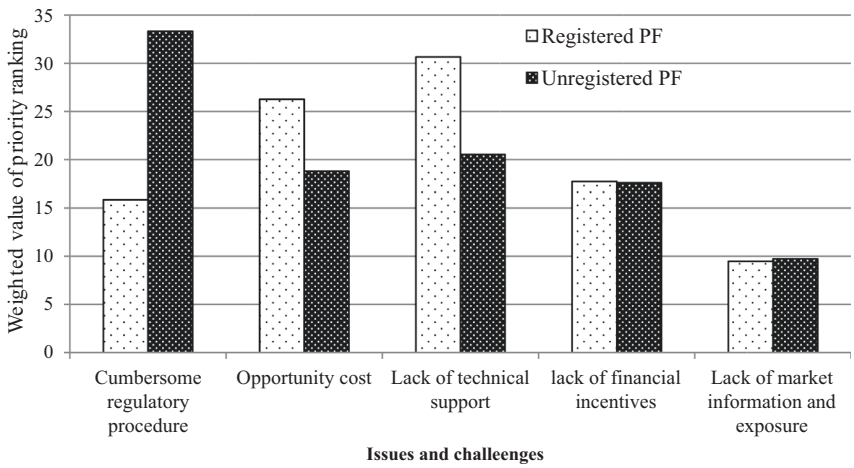


Fig. 9 Weighted ranking by registered and unregistered PF owners against the five major issues

unregistered PF owners have more or less equal concern about the lack of financial incentives and lack of market information and exposure.

Discussion

Prospects and Potentials of PF

PFs have been considered a high potential forestry development program to support economic and environmental objectives in Nepal (Bhattarai 2014; Maraseni et al. 2017; Subedi et al. 2014; Chhetri et al. 2017). Accordingly, our study also supports a notion that there is a high potentials for PF development in Nepal, especially in the forest-rich western part of Nepal, such as the Sudoorpashchim province. However, the number of registered PF is few compared to the existing number of PFs, implying that there is huge scope for further PF registration, its systematization and proper management[13]. The proportion of registered PFs in lowland districts is remarkably higher than that of hilly districts. This is mainly because of the lack of awareness about PF development in the hilly remote areas, and the target programs of the government might not be effective in

[13] Interview, provincial government officials.

mainstreaming the scattered PF owners in Midhills of Nepal[14]. Also, because of a remarkable difference in regulatory procedures of timber harvesting and sells between registered and unregistered PFs, unregistered PF owners have to bear a complicated procedure for forest product harvesting and selling from their own land[15]. Nonetheless, our findings show more than two-third of the total timber supply from PFs was from the hilly districts. This paradox indicates a high potential for PF development, even in agrarian-based communities in the hilly areas of Nepal.

Regarding the species preference, mostly exotic tree species are abundant in PFs of lowland districts, whereas hilly districts have an abundancy of indigenous tree species. PF owners in lowland districts are practicing commercial plantation for timber production, whereas PF owners in hilly districts are raising naturally regenerated trees mostly for household consumption. As the fallow land in hilly districts are increasing due to the outmigration for employment and others, the abundance of naturally regenerated trees in private fallow lands is also increasing (KC et al. 2017). The potential of PF development is assumed to be further developed through tree plantation in marginal lands with short rotation period, ensuring early income from PFs (Maraseni 2008; Subedi et al. 2014; Maraseni et al. 2017). Nevertheless, we found some conflicting policy provisions about tree species harvesting from PF. For example, species such as *S. robusta* and *Pterocarpus marsupium* are some of the 26 recommended tree species to grow in private lands by Private Forest Development Directives, 2011, but farmers are not allowed to sell those species as per the current provision of Forest Regulation 1995. Likewise, an amendment to Forest Regulation in 2015 listed *D. sissoo* as one of the 23 selected species to ease harvesting and supply from PFs, but it is enlisted in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora that needs prior approval to export. Besides this, PFs owners are also said to be demotivated because of the ban in high-value tree species (Paudel and Bhattarai 2015), and the owners are obliged to harvest and sell mostly the low-valued timber species[16]. There seems an immediate action on strengthening regulatory and monitoring mechanisms for illegal logging rather than putting a ban on harvesting high-value timber species[17] (Maraseni et al. 2006; Heinen and Shrestha-Acharya 2011).

In the frontline of controversies about comparable transaction costs of community-based forest management models and private forestry (Sakurai et al. 2004), we found that PFs program are cost effective in accelerating timber supply in the domestic market. There is a very small number of registered PF and the average size of individual forest land is not economies in scale. Yet, timber supply from PFs is substantially high. For example, number of registered PFs in Dadeldhura ($n = 4$), Baitadi ($n = 3$), and Achham ($n = 1$) was very few, but the timber supply was considerably higher from PFs of those districts, accounting 54,359, 45,636, and 39,238 cubic feet, respectively. In connection to this, it can be said that there are large number of unregistered PFs in Sudoorpashchim, which can be administered and registered to enhance sustainable forest management and timber production[18]. Since there are more than 3000 registered CF in Sudoorpashchim province, timber supply from CF regimes is found to be the highest. Timber supply from PF in this province is sixfolds higher than collaborative forestry regimes and fourfolds higher than government-managed forests (Fig. 10). However, it is pity that the government investment on core private forestry program shares less than 3% of the total budget in forestry sector in fiscal year 2018/2019. Therefore, PF is economically efficient and effective means for enhancing supply of forest products to minimize the gap between demand and supply of timber[19]. Our finding is in line with the argument of Sakurai et al. (2004) that timber tree management is more efficient through private management in comparison to collective management. Similarly, Lescuyer (2013) support a notion that small-scale private forestry can be a reliable program for socio-economic development of nations. In hilly areas of Nepal, timber production from PFs is considered from mostly unmanaged fallow lands, indicating that PF has a huge potentials for timber supply when they are thoroughly administered (through forest registration) and properly managed. In connection to this, KC et al. (2017) advocated for an integrated land use planning to flourish the environmental and economic potentials of fallow lands in hilly regions. Furthermore, as the tenure rights in PF is clearer than community-based forestry regimes, PF can be more efficient in terms of forest governance and sustainable timber production[20].

Reflection on Institutional Arrangement

Repeated inclusion of PFs in policy content (since the Forest Act 1961 until current Forest Act 2019) but poor deliberation indicates that unclear procedural guidelines and poor institutional arrangement has always been constrained PF development (Amatya and Lamsal 2017). Lack of strategic program, inadequate government support, dubious

[14] Interview, representatives of PF network and representatives of local government.
[15] Interview, representatives of PF network.
[16] Interview, representatives of PF network.
[17] Interview, civil society actors.
[18] Interview, provincial government officials and civil society actors.
[19] Interview, representatives of PF network.
[20] Interview, civil society actors.

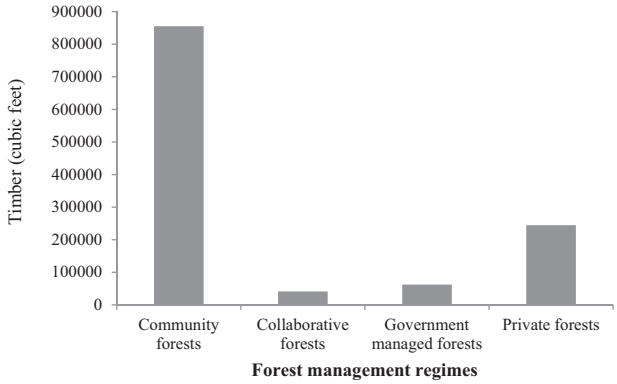


Fig. 10 Comparison of timber supply arising from different forest management regimes from Sudoorpashchim province in the fiscal year 2018/2019

institutional arrangements, and some socio-cultural constraints are the reasons for underdevelopment of PFs (Dhakal et al. 2012; Subedi et al. 2014). Getting permits from government authority (i.e., DFOs) for every instance of harvesting and selling of forest products that are grown in private lands is one thing. On top of that, collaboration and coordination with multiple government offices (i.e., Office of land survey, Land revenue office, Local government, and others) and getting their permission by an unregistered forest owner is beyond the capacity of individual farmers[21]. PF owners in Nepal are mostly from the financially challenged communities and they do not sell trees in large lots but from the small patches with few trees to satisfy their household needs. So, getting permission for every single harvesting and transportation is painful[22]. Amatya and Lamsal (2017) noted that PF owners have to go for more than 14 steps for harvesting and selling of forest products grown in their own land. Furthermore, the procedural steps (see Fig. 4) have to be repeated for getting harvesting permit for every next time for unregistered PFs. If the paperwork and time value of all the actors of getting the permits for harvesting and transportation would have been considered, which we recommend for future research, it would further clarify the regulatory costs and its burden to PFs owners. Although, we could not find a comparable study in Nepal, a study by Maraseni et al. (2018) in Lao PDR found that farmers have to bear the regulatory cost of US$1724 per ha (i.e., 39% of the total harvesting and transportation cost). It indicates that the motivation of PF owners is diminishing not only because of the complex procedures but also due to low return on investment for PFs development as deduced though regulatory costs. If the policy provisions are to be implemented there should be an unified mobile service (*Yekikrit Ghumti Sewa*), but due to the lack of simplified procedural guidelines and institutional arrangement PF owners have to satisfy the requirements of multiple government offices[23]. Ban on timber felling for some high-value species on one hand and poor implementation of the policy provision of free harvesting and selling of 23 selected species (especially in the remote areas of hilly districts) on the other, both diminishing the motives of PF owners to grow forest in their private lands (Bhattarai 2014).

Of the major concerns in PF development and regulations, identification, and validation of standing trees whether it lies in private or public land is the major concern of investigation in the field[24]. Since all the large blocks of privately owned forests were nationalized after the Private Forest Nationalization Act 1957, only small patches of PFs are existing in Nepal (Sakurai et al. 2004). Accordingly, private land in hilly districts of Nepal is of small scale, fragmented, and adjoined with government forests and/or public land (Nagendra et al. 2008). In this regard, government authorities are always in fear of the happening of the malpractices of harvesting trees from public land, by making a false statement that the trees are from private land[25]. For example, complication of land ownership, as for *Tectona grandis* in Laos PDR (Maraseni et al. 2018), is pertinent for species like *D. sissoo and Acacia catechu*, that are found in the lands adjoining to river, due to the lack of reference for distinguishing private and public lands based on the available old drawing cadastral map[26]. In order to minimize the risk of illegal felling from public land, institutional arrangement should be strengthened for regular monitoring, patrolling, database management, digital blueprint map, and modernization of land registration documents. Instead, the government put a lengthy and complex procedure to check and balance the fear of illegal felling at the cost of additional time and money of the PF owners[27].

The problem of institutional arrangement does not persist only for the unregistered PFs but also for the registered PFs. For instance, once a PF is registered, there is no assurance of technical support and financial incentives. In case of Laos PDR, which is most stringent in PFs, the government has ensured property rights on planted trees, allocated lands for tree planting and exempted the land tax for registered plantation (Maraseni et al. 2018). In our case, even the registered PFs are not waived of land tax for establishing forests on an individual farmer basis (Amatya and Lamsal 2017). As opposed to CF, where neither land tax nor the forest product tax (except for *S. robusta* and *A. catechu*) is collected by government, both registered and unregistered

[21] Interview, representative of PF networks.
[22] Interview, representative of PF networks and civil society actors.
[23] Interview, civil society actors.
[24] Interview, provincial government officials.
[25] Interview, provincial government officials and representatives of local government.
[26] Interview, provincial government officials.
[27] Interview, representatives of PF network.

PF owners have to pay tax[28]. Although some of the networking organizations of PFs are emerging (i.e., Federation of PF Stakeholders and Association of Family Forest Owners Nepal), they have not been effective, and the issues and challenges faced by PF owners have not been raised as such. Moreover, the role of PFs in environmental conservation, ecosystem services, climate change mitigation, and creation of green jobs have not been mainstreamed in provincial and national policy platforms (Aryal et al. 2019; Pandit et al. 2013).

In addition, programs and budget for PF development is also inadequate. Only four core programs were found be implemented in Sudoorpashchim province targeting PFs, allocating a budget of US$30,000 for the whole area of this province. Moreover, the programs were designed and implemented on ad-hoc basis through top-down approach[29]. As we observed various development assistance for other forest management regimes, such as CF and collaborative forestry, PFs development program in Nepal has never been the priority for international development partners and other nongovernmental organizations to support capacity building and boosting of the PF development programs[30]. There is a lack of strategic plan and programs regarding public awareness, capacity building, technical know-how, and other administrative as well as financial aspects of the PF management and development.

Farmers' Perspective on Policy and Institutions

Procedures of forest product supply and perception of the PF owners also differs accordingly to whether they have registered or not registered the PFs. Compared to the lowland districts (52%), higher proportion of respondents (68%) from the hilly districts mentioned that they did not register their PFs because of the lack of policy awareness. Respondents from lowland districts perceive the registration process is complicated, whereas that of the respondents from hilly districts perceive other reasons such as geographical remoteness and unavailability of large blocks of PFs. Regarding the time elapses for getting approval for harvesting, felling, and sales of forest products, unregistered PF owners have to spend an average of 13 more days than registered PF owners. Concurrent with Bhattarai (2014), our findings also show a lengthy process of getting the approval, especially for unregistered PF, upto 2 months. The owners are found to be irritated with this lengthy timing. Besides, unregistered PF owners see legal procedures for forest product harvesting and sales as very complicated and demanding. None of the respondents from unregistered PFs perceive the procedures for timber harvesting and sell as easy; however, most of the respondents from the registered PF rated it as medium. This indicates that there is a lack of specific policy procedures and implementation mechanism to ease forest product harvesting and sells from PFs.

Even after the successive policy reforms for PF development for the last half century, field reflection shows that the PF policy reforms are not properly internalized in plans and annual programs. As Bhattarai (2014) mentioned, PF owners have very little knowledge about seedling quality, tree species characteristics, and forest management skills, PF development programs have not focused yet to address the demand for different types of technical support, as required by PF owners according to differing bio-physical and socio-economic characteristics of the specific region and their unique management objectives (Finley and Kittredge 2006; Żmihorski et al. 2010; Regmi and Garforth 2010; Hemström et al. 2013; Cedamon et al. 2018). The issue of high opportunity costs raised by registered PF owners imply that once the PFs are registered, the owners are tend to be bounded by national laws and perceive that they missed the opportunity of growing other crops/horticulture. Accordingly, ensured security and the provision of insurance might be a promising solution to sustainably develop PFs programs (Paudel and Bhattarai 2015). PF owners do not see market as a problem, regardless of the registration, implying that there is potentially a good market and hence PF programs should be further developed and expanded to meet the market demand (Lamsal et al. 2017). Besides, our study shows that financial incentives are not the impactful measure for PF registration. Not only the adequate policy measures but also the assured mechanisms of translation of policy contents into practice through appropriate institutional arrangement, programs and annual budget are indeed necessary to unlock the potentials of PFs for overall economic and environmental benefits at the local and national level (Paudel and Bhattarai 2015; Amatya and Lamsal 2017).

Conclusions

We assessed and analyzed the status of PF development program from the perspective of policy provisions, institutional arrangements, and field level observation. PF has not gained momentum in Nepal even though it has been recognized as one of the potential contributing programs for environment conservation and economic development by government policies. Poor deliberation of policy contents into plans and programs on one hand, and the lack of policy awareness and poor institutional development of the owners of PFs on the other hand stagnated the development of PF program in Nepal. Moreover, conflicting regulatory provisions, especially in case of ban in tree harvesting and sale,

[28] Interview, representatives of PF network.
[29] Interview, civil society actors.
[30] Interview, civil society actors and provincial government officials.

further exaggerate the problems in PF development. We found that very few numbers of existing PFs are registered and many other PFs are yet to be registered in Sudoorpashchim province. PF owners in the lowlands grow plantation forests of mostly exotic tree species (such as *Eucalyptus camaldulensis, T. grandis*), while indigenous tree species, mostly conifers, are common in the hilly districts. Administrative procedure for forest product supply from registered and unregistered PFs is lengthy and onerous. Especially, the unregistered PF owners have to repeat the complex procedures for forest product harvesting for every instance, even from the same land. Both registered and unregistered PF owners univocally suggest that cumborsome regulatory procedures and lack of technical support are the most prominent issues and challenges in PF development. In order to enhance and accelerate PF to ensure environmental sustainability and economic development of the country, the following government interventions are recommended:

(1) Promote PF registration and facilitate harvesting of high-value timber species through conducive policy measures.
(2) Develop an effective institutional arrangement and organizational structure to translate policy contents into practice, especially for reducing the procedural steps and time lapses for getting harvesting and transportation permits.
(3) Strengthen monitoring mechanisms to minimize illegal harvesting rather than adopting complex procedure for forest product harvesting and sells.
(4) Focus on awareness and capacity building of PF owners in terms of their institutional strengthening, suitability of tree species and technical know-how of forest tree management.
(5) Create enabling environment by providing incentives (such as, land tax remissions and provision of insurance) and mainstreaming of PF development policies in annual plans and programs through bottom-up approach.

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Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

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