

Implementing SDG-15 Through Community Forestry Management A Case of Tarpakha Community Forest, Gorkha, Nepal

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Abstract

Community forestry shifts power of management of forest from government to the community. At the same time, the Sustainable Development Goal (SDG) 15(2) aims at sustainable forest management. This study aims at implementing SDG-15 through community forestry management in Nepal. Questionnaire survey method was applied for generating the qualitative data from the members of the Tarpakha Community Forest User Group along with interviews with concerned stakeholders of the forest user groups and field observation for understanding the real scenario of the forest and its surrounding. Out of information acquired from the survey, dependent and independent variables were categorized. For checking the effectiveness of one set of variables for sustainable management of forest, the variables were cross tabulated using Pearson's Chi square to test association and Phi and Cramer's V were used for further verification. Inspection of forests, plantation of forest, fire control, imposition of fines has been effective ways for sustainable forest management. Similarly, the conservation and management of forest resources are influenced by socio-economic benefits that are delivered to the people and the inclusive policies that are implemented in management approach. More enhancement in activities of community forestry user groups will surely help in achieving SDG – 15(2) by targeted period.

Keywords: Community forestry; SDG – 15(2); Sustainable forest management; Participatory management; Nepal forest conservation

1. Introduction

Community forestry has been a proven mechanism for the conservation of forests whose management is controlled by the community, meeting the principles of sustainable use of resources (Charnley and Poe, 2007). One aspect of community forestry focuses on resource conservation and the other encompasses the sustenance of people dependent on those community forests

(Dhruba Bijaya *et al.*, 2016). The sustenance on the other hand comes with the realization of ownership and a sense of responsibility among people utilizing the benefits (Enukwa *et al.*, 2022). This ultimately helps generate social, economic and environmental prosperity for the people benefitting from community forestry (Charnley and Poe, 2007; Dhruba Bijaya *et al.*, 2016).

Community forestry as the means for sustainable forest management evolved in Nepal in the late 1970s as a forest management mechanism (Acharya, 2002). This has shifted the responsibility of management of national forests to the beneficiaries (Pradhan *et al.*, 2017; Luintel *et al.*, 2018). It has been established as a strategy for forest management since then and has conferred the rights to local people on natural resources that is based on the forest user group model (Kanel and Kanel, 2004). The community forestry has the privilege of managing the land on which the forest is situated; the right on the land however is in the control of the Government (Pradhan *et al.*, 2017).

A present need of the society is to have enhanced socio-economic conditions with properly functioning environmental phenomena (Sachs, 2012). Such state of the society has been described as the sustainability and the process to achieve it as sustainable development. The sustainable development thus can be defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987). Realizing this, the United Nations General Assembly adopted Sustainable Development Goals (SDGs) in 2015 as part of the commitment to human development and stability of the Planet Earth. This was taken over by 193 countries of the United Nations and assured to work for the prosperity of the world through actions and partnerships among all participating nations (Gigliotti *et al.*, 2018). The SDGs incorporate 92 paragraphs, the 59th of which lists 17 goals, 169 targets and 232 indicators. The 17 goals are inclusive in nature and the core of the goals lies in the fact that, the treatment of all goals in holistic ways identifying the linkage of one goal to the other provides a blueprint for success of the agenda (Weiland *et al.*, 2021).

The plans shift from acknowledging the goals to administering and finally pulling off the results (Stafford-Smith *et al.*, 2017). The aim is to enhance the livelihood of people and forests act as important supplier of resources for boosting the livelihood (Ali and Rahut, 2018). In this process, the community forestry acts as yardstick determining the success of the target set in Goal 15 specially

in 15.2 that aims at ending deforestation and restoring degraded forests (Aryal *et al.*, 2020). Out of 17 SDGs, the SDG-15 recognizes the importance of forest protection and its sustainable management which states: protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss. A few targets are set in this goal however the present study concentrates on SDG- 15(2) that specifies “promoting and implementation of sustainable management of all types of forests, and halt deforestation” (United Nations, 2015).

Nepal is a party to the UN Agenda for Sustainable Development Goals 2030. It has incorporated the targets in its 15th five-year plans reciprocating with the targets set by the agenda. At the same time, community forestry has been an important initiative in the context of Nepal. It is worthy of focusing the grassroots perspective, demographic decision-making, and free of imposition by incorporating intergenerational and marginalized viewpoints for the protection of forests through community user groups (Buscher and Fletcher, 2019; Krauss, 2022).

The present study aims of connecting the SDG 15(2) with the community forestry and discusses to what extent the community forestry approach helpful for sustainable management of the forest and halting deforestation. The study concentrates on Tarpakha Community Forestry User Group (TCFUG) and assesses how the group has been able to manage the community forest in a sustainable way for forest protection ultimately facilitating the progress in meeting SDG-15(2).

2. Materials and methods

2.1 Study area

The present study was carried out in Siranchowk Rural Municipality of Gorkha district and Tarpakha Community Forest (TCF) in the Rural Municipality’s ward number 8 was selected as the study site in the author’s judgement. The nature of the forest is natural and is situated in subtropical

region of the district ranging from 500 - 600 meters above sea level stretched at 0.4212 square kilometers. The proportion of slope in the forest is 15 - 25 %. The forest accommodates different floral, faunal and avian diversity. Animals present in the jungle are leopard, deer, monkeys, porcupines, and the dominant plants are *Schima wallichii*, *Semecarpus anacardium*, *Syzygium cumini*. The community forest was handed over to the community in 1994/1995, making it one of the oldest community forests in Nepal that has been practicing sustainable forest management since long. At the same time, the forest lies in hilly region of Nepal that occupies majority (65 %) area of community forestry in Nepal (Chapagain and Aase, 2020). As such, the location, and its long-laid history towards sustainable forest management, TCF in Gorkha was chosen as our study site.

2.2 Data collection

The study has adopted mixed method approach. Data collection placed equal weightage to both the qualitative and quantitative data collection approach (Creswell, 2014). As such, both qualitative and quantitative data were acquired for primary data collection. For generating these primary data, the main approach applied was questionnaire survey method. This method has been effective in acquiring direct response from the people and provides a way in comparing the results generated out of each respondent (Martin, 2004). The Tarpakha community forestry user group comprises of 163 houses. The aim of this questionnaire survey was to administer the questionnaire to a member each representing those 163 houses.

However, based on the readiness of the respondents for participating in the survey, the effective size of the respondents was 156. In addition to this, the key informants associated with the community forest; executive members of the user group, local representatives, official of forest office were interviewed.

The successful implementation of SDG-15 target for sustainable forest management could be affected by legal instruments, active participation of beneficiaries (for different conservation activities like inspection of forest, putting off fire, participation in planning meeting, imposing fine etc.) and adoption of inclusive policies. So, for the analytical part of the study, the independent variables and dependent variables were selected. Legal instruments (plans, policies, and rules), active participation of community members and adoption of inclusive policy were considered for the independent variables. This is in line with the fact that the involvement of community should prioritize economic benefits and planning for the losers which ultimately generates integrity of socio-economic and environmental values (Duguma *et al.*, 2018).

2.3 Data analysis

As the dependent variable to these independent variables, ‘implementing sustainable forest management in line with SDG-15 for protecting forest’ was considered. For checking the effectiveness of one set of variables for sustainable management of forest, the two variables were cross tabulated using Pearson’s Chi Square to test association and Phi and Cramer’s V were used for further verification.

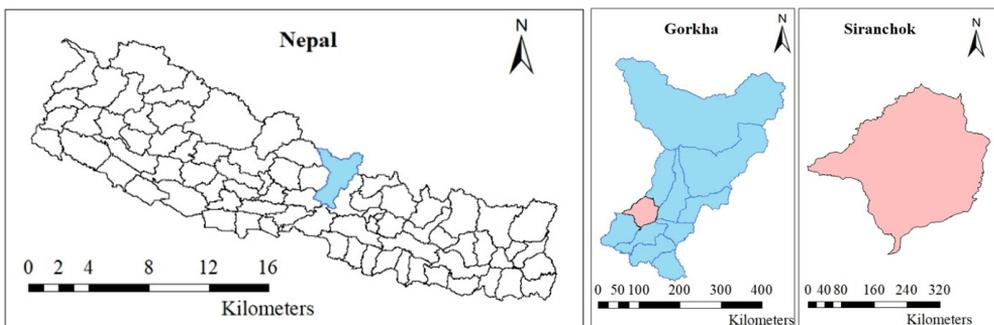


Figure 1. Location of study area

Chi-Square test considers categorical data to express their relation; connection or the deviation (Franke *et al.*, 2012; Singhal and Rana, 2015; Ugoni and Walker, 1995) establishing itself as a tool to test variables expressed in nominal form (Turhan, 2020). Cramer's V on the other hand shows how strong the variables under consideration are associated (Ugoni and Walker, 1995). In addition to these, few cases were developed to portrait the real picture of community forestry scheme. All data analysis was carried out using IBM SPSS.

3. Results and Discussion

3.1 Outcome of Tarpakha Community Forest (TCF)

The region occupied by TCF was almost naked before handing it over to the local community for management almost before three decades. With the handover of the management, the forest started gaining its shape; the young trees started growing and new plants started to regenerate. The forest has become dense and turned out to be the habitat for wildlife over time. At present the forest provides habitat for animals like deer, monkey, and bird. Regeneration of species, their composition, stand density and increasing carbon stock were some of the positive changes observed in the TCF. Further, the water availability in the local sources such as Bhyaure, Saunepani, Snadhi and Banspani Streams has increased attributing to the increment of forest cover. The community has been realizing the increase in water availability due to the protection activities which has facilitated for water acquisition even in the dry seasons as mentioned by the executive member of the user group.

However, it was necessary to understand the views from the direct beneficiaries of the community forestry, the members of the user group. For the vary purpose, the questionnaire survey was carried out. Out of 156 respondents for the study, 82 were males and 74 were females. Most of the respondents were ethnic people followed by Brahmins and Dalits accounting 45 %, 40 % and 15 % respectively. The approach of acquisition of

information from beneficiaries is effective in understanding the effectiveness of the community forestry and the satisfaction it provides to the users. As for the effectiveness of the community forestry in conserving forest that reciprocate with the target of SDG-15, 55 % of the respondents thought it to be effective and 45 % took the initiative as ineffective. The respondents were presented with Likert scale of 1-5 for expressing their views on the effectiveness of the community forestry; 1- denoting very much ineffective and 5-denoting very highly effective. The output was generated in the form of 'ineffective' and 'effective' each incorporating extremes and lows in both the categories. For satisfaction level of conservation of TCF, the question with Likert scale from 1 to 5, 1-expressing very much dissatisfied and 5-very highly satisfied was administered to the respondents. The result showed 62% of the respondents were satisfied and 38% dissatisfied with the conservation of TCF. The gap between effectiveness and ineffectiveness of conservation of TCF was low. However, in the case of satisfaction among people, a considerable number of people were satisfied in comparison to dissatisfaction.

3.2 Influencing variables for effective implementation of TCF activities

The effective implementation of various activities plays a crucial role in making a community forestry initiative effective for sustainable forest management. The activities were categorized as variables in leading towards forest conservation. The major variables under conservation of forest considered were inspection of forest, plantation of forest, fire control and imposition of fines. Further, the income generation, benefit of forest products and adoption of inclusive policy were taken as socio-economic activities in the TCFUG.

3.3 Inspection of forest

The inspection of forest helps in monitoring status, planning for protection, and controlling illegal destruction of the forest. It acts as one of the major functions of the community forestry

user group and the major stakeholders in carrying it are the community members. For the reason, the correspondents were presented with the questionnaire for acquiring their interest in participation in the forest inspection in a range of scale from 1 to 5 (1 for very low level of interest, 2 for low level of interest, 3 for some interest, 4 for high level of interest and 5 for very high level of interest). Most of the correspondents showed high level of interest with 33 % who thought the inspection of forest is effective for forest conservation and 13 % who took it as ineffective. Overall, 55.1 % of the respondents found the inspection of forest to be effective and 44.9 % as less effective for forest conservation. In comparing the effectiveness and inspection of forest, the chi-square value was 24.539 with < 0.001 significance (Table 1). For p-value being smaller than the standard alpha value, the two variables are independent of each other. In other words, the result is significant as the variables, 'inspection of forest' and 'level of effectiveness' are associated with each other. The Phi value and Cramer's V value show 0.397 with < 0.001 significance (Table 2). It gives positive strengths of the logic. Thus, the inspection of forest and level of effectiveness which show the conservation of forest is satisfactory in line with the SDG-15.

3.4 Plantation of forest

The communities were requested to join plantation activity every year in June/ July. When asked about the effectiveness of plantation for forest management, 55 % of the respondents were inclined towards effectiveness and 45 % towards less effective. The Chi-square value is 13.767 with 0.008 significance (Table 1). Here the p-value is smaller than the standard alpha value, so the two variables are independent of each other. The result is significant as the variables, 'plantation of forest' and 'level of effectiveness' is associated with each other. The phi value and the Cramer's V value show 0.297 with 0.008 significance also provides the positive strength to the logic. Thus, plantation of forest and level of effectiveness shows the conservation of forest is satisfactory in line with the SDG-15 target.

3.5 Fire control for TCFUG's role for conservation

As for fire control mechanism for management of forest resources, 55 % of the respondents thought it to be effective and 45 % thought it to be less effective. The Chi-square value is 16.899 with 0.002 significance (Table 1). Here, the p-value is smaller than the standard alpha value, so the two variables are independent of each other. In other words, the result is significant – as the variables 'plantation of forest' and 'level of effectiveness' is associated with each other. Phi value and Cramer's V value show 0.329 with 0.002 significances also gives positive strengths of the logic. Thus, the putting off fire in the TCF and level of effectiveness shows the conservation of forest is satisfactory in line with SDG 15 target.

3.6 Imposition of fines

Imposition of fines is another mechanism for management of forest resources. Among the respondents, 55 % found effective compared to 45 % less effective for fine imposition as a means of forest management. The Chi-square value is 10.812 with 0.029 significances (Table 1). Here, the p-value is smaller than the standard alpha value, so the two variables are independent of each other. In other words, the result is significant – as the variables 'plantation of forest' and 'level of effectiveness' is associated with each other. The Phi value and Cramer's V value show 0.263 with 0.029 significances also gives positive strengths of the logic. Thus, plantation of forest and level of effectiveness shows the conservation of forest is satisfactory in line with SDG 15 target.

3.7 Socio-economic benefits

The initiative of community forestry causes the economic conditions to be well off (Gbedomon *et al.*, 2016). Several activities have been carried out by TCFUG for the socio-economic development of community members. For this, three variables – fulfilment of the forest resources, financial benefits of the community and adoption of inclusive

policies were taken to find out the interest of community members. Generally, in Nepal, most of the CFs are collaboratively managed to meet their members' forest products such as fodder, firewood and forest related construction materials needs. TCFUG has incorporated several socio-economic benefits for fulfilment of forest resource needs. Such forestry products are directly/indirectly related with the agricultural as well as non-agricultural production which contribute to the meet the livelihoods of the community.

3.8 Income generation

For promoting socio-economic benefits to the community members, TCFUG has supported income generating activities such as skill development training, vegetable farming, goat farming, grocery, and local furniture production. As it has close relations with local financial cooperatives, it recommends loan facilities to support community members' income generating activities. In this context the respondents were asked whether the income generating activities were effective and helpful for participating in the TCFUG activities which has been implementing the sustainable forest management programs. Among the respondents, 55 % were inclined towards the effectiveness of the income generating activities and 45 % thought them to be ineffective. The Chi-square value is 33.499 with < 0.001 significances (Table 1). Here, the p -value is smaller than the standard alpha value, so the two variables are independent of each other. In other words, the result is significant – as the variables 'income generating' and 'level of effectiveness' is associated with each other. The Phi value and Cramer's V value show 0.463 with < 0.001 significance, also high level of positive strengths of the logic. Thus, income generating activities such as access to loan facilities, skill development training and income generating activities and level of effectiveness shows the conservation of forest Tarpakha Community Forest is satisfactory.

The economic empowerment of the community was also supported by loan scheme and support to local furniture workshop for generating income and employment.

The loan given for livestock farming to those poor economic background members was found helpful to generate additional income in the family. The empowerment factor has contributed to encourage local participation to protect sustainable community forest in case of TCF.

3.9 Benefit of forest products

To account for benefit of forest products for conservation of forest, 60 % of the respondents thought it to be effective compared to 40 % less effective. The Chi-square value is 25.292 with < 0.001 significances (Table 1). Here, the p -value is smaller than the standard alpha value, so the two variables are independent of each other. In other words, the result is significant – as the variables 'income generating' and 'level of effectiveness' is associated with each other. The Phi value and Cramer's V value show 0.386 with < 0.001 significance also gives high level of positive strengths of the logic. Thus, the benefits generated from forest products gives the highest positive value. This is mainly because the forest provides the daily useful materials such as firewood and fodder and agricultural inputs such as plough, etc. Thus, there is high association between forest product benefits and the level of effectiveness which contributes for the conservation of Tarpakha Community Forest. If the benefits of forest products are curbed, other policies to combat the problems that arise due to lack of access to resources must come into operation (Schaafsma *et al.*, 2014).

3.10 Adoption of inclusive policy

Socio-economic empowerment of the community TCFUG plays as platform bringing different community members with diverse backgrounds. This enhances the willingness of the community towards conservation of resources for common good (Palmer *et al.*, 2020) Under the inclusive policy of TCFUG dalit, women, lower economic background community were also found involved in the EC of TCFUG and given priority to provide financial supports, skill development training as well as discounts for purchasing forest products.

The 55 % of the respondents found effective compared to less effective (45 %) in relating adoption of inclusive policy towards forest conservation. The Chi-square value is 16.310 with 0.003 significances (Table 1). Here, the *p*-value is smaller than the standard alpha value, the two variables are independent of each other. In other words, the result is significant – as the variables ‘adoption of inclusive policy’ and level of effectiveness’ are associated with each other. The *Phi* value and Cramer’s V value show 0.323 with 0.003 significances also gives positive strengths of the logic. Thus, adoption of inclusive policy and level of

effectiveness shows the conservation of forest Tarpakha Community Forest is satisfactory.

In this regard, as per the residents the involvement of women, dalit and deprived members of the community in the working committee of the forest user group has been able to supply the forest resources at lower cost and at the same time protecting the forest. In fact, the inclusive policy was helpful for motivating these community members to participate in the forest conservation programs. socially empowered as 55 % of the respondents were highly or very highly interested to join TCFUG.

Table 1. Chi-Square tests

Variables	Chi-Square tests	Value	df	Asymptotic significance (2-sided)
Inspection of forest	Pearson Chi-square	24.539a	4	<0.001
	Likelihood ratio	25.395	4	<0.001
	Linear-by-Linear Association	15.954	1	<0.001
Plantation of forest	Pearson Chi-square	13.767a	4	0.008
	Likelihood ratio	13.973	4	0.007
	Linear-by-Linear Association	8.037	1	0.005
Fire control	Pearson Chi-square	16.899a	4	0.002
	Likelihood ratio	17.161	4	0.002
	Linear-by-Linear Association	14.254	1	<0.001
Imposition of fines	Pearson Chi-square	10.812a	4	0.029
	Likelihood ratio	10.905	4	0.028
	Linear-by-Linear Association	6.357	1	0.012
Income generation	Pearson Chi-square	33.499a	4	<0.001
	Likelihood ratio	34.968	4	<0.001
	Linear-by-Linear Association	23.463	1	<0.001
Benefit of forest products	Pearson Chi-square	25.292a	4	<0.001
	Likelihood ratio	24.112	4	<0.001
	Linear-by-Linear Association	11.763	1	0.001
Adoption of inclusive policy	Pearson Chi-square	16.310a	4	0.003
	Likelihood ratio	16.604	4	0.002
	Linear-by-Linear Association	11.582	1	0.001
Number of valid cases = 156 a. 0 cells (0.0%) have an expected count less than 5				

Table 2. Symmetric measures of the Chi-Square tests

Variables	Phi value	Cramer's V value	Approximate significance
Inspection of forest	0.397	0.397	< 0.001
Plantation of forest	0.297	0.297	0.008
Fire control	0.329	0.329	0.002
Imposition of fines	0.263	0.263	0.029
Income generation	0.463	0.463	< 0.001
Benefit of forest products	0.386	0.386	< 0.001
Adoption of inclusive policy	0.323	0.323	0.003

Community forestry has influence over 80 targets of SDGs; 11 of which come under SDG-15, life on land (Aryal *et al.*, 2020). It also creates positive results in either way; the community forestry contributes to executing sustainable development goals and the effective implementation of the goals too causes the community forestry to thrive in successful way (de Jong *et al.*, 2018). It has been an influencing factor in meeting the aim of sustainable management of forest resources (FAO, 2019). An initiative of sustainable forest management, the community forestry acts as the provider of benefits of forest resources with conserving those at the same time (Dev and Soussan, 2003; Baynes *et al.*, 2015; Gatiso, 2019). The results of this study suggest that the community forestry acts as an influencing mechanism in sustainable forest management that ultimately lines with the fulfilment of SDG – 15(2). The community forestry user group, TCFUG, under our consideration for this study has shown satisfactory results in managing forest in a sustainable way. The impact of management activities has caused increase in forest cover, availability of faunal and avian diversity which can be further validated by results obtained from the survey of the community where the effectiveness of management activities is quite effective with more than half of the respondents satisfied with the activities of the community forestry user group. The statistical analysis of management activities shows results in satisfactory line; the activities being inspection of forest, plantation of forest, fire control, imposition of fines, socio-economic benefits and inclusive policies in management scheme. Similar study in British Columbia has devised mainly

two parameters, employment and culture of people while considering sustainable forest management and the result has shown a good performance (Assuah *et al.*, 2016). Similarly, the study conducted in Benin, Western Africa shows that with the considerable presence of community in managing forest ultimately leads to enhancement of conservation along with the life of people dependent on forest resources (Gbedomon *et al.*, 2016). A study conducted in 45 forest user groups in Nepal however shows that even if the statistical tests provide valid results for the effectiveness of such management initiatives, the ground truth may not always be true and the benefits might be concentrated to those in power in social hierarchy (Karki and Poudyal, 2021). In this scenario, the theoretical mechanism may not be sufficient in designing the management parameters but also the social, economic, and political affinities of the consumers (Deb, 2020). As such in designing such initiatives, the lowest advantaged groups of the people must always be focused, a review study carried out in Nigeria shows (Agbogidi *et al.*, 2007). So, the proper management of forest and its resources do carry a great essence towards sustainable forest management ultimately leading to achieving targets of SDG - 15(2) in the targeted period. In this scenario, more aspects of management initiatives can be scoured that best fits the objective of conserving forest resources in a sustainable way (MacDicken *et al.*, 2015). This will help for achieving the targets of conservation and its associated phenomena regarding livelihood of people, social and economic parameters, and the global goal of forest conservation for a better environment. In this regard, the present study will act as a guiding

document for future discourse in connecting the issue of sustainable forest management with community-oriented strategies and provide the policy makers a way of designing programs with maximum focus on deriving benefits from the community forestry to all the concerned stakeholders associated with it.

4. Conclusion

Community forestry has been an important enterprise in transferring management regime of forests from government to the community. This scheme of the forest management, apart from ensuring rights of people upon forest resources for enhancing livelihood, is one of the important initiatives in managing forest sustainably that has direct influence on executing SDG – 15(2). Various factors a community forestry user group execute results in sustainability of forest management. The factors; inspection of forests, plantation of forest, fire control, imposition of fines do have effectiveness in satisfactory way for sustainable forest management. Similarly, the conservation and management of forest resources are influenced by socio-economic benefits they deliver to people and the inclusive policies that are implemented in management approach. The community forestry does carry the essence of sustainable forest management that directly helps in meeting the target of SDG – 15(2). The community forestry should be prioritized, and several initiatives can be launched for empowering the user groups for more and effective results which directly provides a pathway for concise forest resource management thus helping in achievement of SDG – 15(2) by targeted period.

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