IMPACT OF PARTICIPATORY FOREST MANAGEMENT ON THE LIVELIHOODS OF INDIGENOUS COMMUNITIES

By

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(2016-17-003)

THESIS

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DECLARATION

I hereby declare that the thesis entitled **"IMPACT OF PARTICIPATORY FOREST MANAGEMENT ON THE LIVELIHOODS OF INDIGENOUS COMMUNITIES"** is a bonafide record of research done by me during the course of research and that this thesis has not previously formed the basis for the award of any degree, diploma, fellowship or other similar title, of any other University or Society.

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Dedicated to my parents

CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF PLATES

Plate No.	Title
1	Data collection at Vazhachal VSS
2	Data collection at Kunchipara VSS
3	Data collection at Anapantham VSS
4	Data collection at Vazhachal VSS
5	Data collection at Karikadavu VSS
6	Data collection at PoovanchiraVSS

LIST OF APPENDICES

Appendix No.	**Title**
I	Interview schedule for impact analysis
II	Interview schedule for perception analysis

Introduction

1. INTRODUCTION

For long time in independent India, the forestry establishment followed "socially exclusive" forest management policies and activities. People were considered as a major "threat" and hence were not direct participants in forest management. Our National Forest Policy of 1988 challenged this notion because it underscored the view that "forest is a gene pool reserve" and its protection will be better through the participation and cooperation of the common man. Taking a "paradigm shift" this policy put forth the concept of "joint management of forest" through the equal participation of forest department, indigenous people and forest fringe communities. Joint forest management is a dynamic and institutionalized process closely associated with the behavioural aspect of stakeholders because it demands change in their attitudes. It was first started in West Bengal and later the Government of India issued the official guidelines in 1990 to involve local communities in forest protection activities. Forest degradation and deforestation which lead to decrease in forest cover had always been a concern for the Indian policy makers. The effective reduction of these problems and enhanced protection of forests, it was realized, was possible only with the involvement of people. Slowly, active community participation was encouraged which also build rapport between local communities and forest department officials. As the life of forest dwelling and forest fringe communities also revolve around the forest, the rationale in involving tribal people in forest management and protection activities got justified. Moreover, as tribal people also share a symbiotic relationship with forests, their indigenous knowledge on the use and value of the resident forest biodiversity is a valuable additional asset in framing crucial forest management decisions. On the other hand, JFM also provides opportunities at empowering local people for their active participation in management of forest and sharing of the benefits derived from it. Women participation was additionally ensured in the JFM programmes, as at least 50% members of the general body and at least 33% of the executive committee membership should be women.

In Kerala, JFM was introduced as Participatory Forest Management (PFM) in 1998. In many Indian states, involvement of local people in management of forest has not only contributed to the restoration of degraded ecosystems but also in forest regeneration. One of the stated objectives of JFM implementation is the improvement of livelihoods apart from improved forest cover. Participatory forest management initiatives can therefore reduce poverty as it provides better livelihood opportunities and source of income. Many JFM communities have economically and socially benefited from these livelihood opportunities through sale of non-timber forest products, sharing of benefits etc.

Many studies on the Joint Forest Management activities in India have been published. But studies on the impact of Joint Forest Management activities, especially their impacts on rural livelihoods are very rare. Livelihood monitoring is critical for JFM and can be understood by effective monitoring through an impact-pathway approach. Without effective monitoring, it is not possible to know whether the JFM goals have been achieved and its success rate and the need for further improvement. The sustainable livelihood framework is a holistic approach to analyse the impact on livelihoods by identifying five capital assets. Sustainable livelihood analysis focuses on five identified capital assets, such as financial capital, physical capital, human capital, natural capital and social capital which contribute to the possible livelihood outcomes. The influence of livelihood enhancing interventions are being measured by assessing the impact on these five capitals. The impact of JFM activities can be measured using the Sustainable livelihood analysis (SLA) approach. A livelihood is sustainable only when it can cope with and recover from the stresses and shocks and enhance its capabilities and assets now and in the future without reducing the natural resources.

It was on this background that a study was attempted to document the impact of Participatory Forest Management on livelihoods of indigenous communities in Central Forest Circle, Thrissur. This impact study was carried out in selected tribal Vana Samrakshana Samithies under this circle. The main PFM activities in Central circle are NTFP collection and ecotourism and most of the

tribal people here depend upon these activities for meeting their livelihoods. All the forest areas in Central Forest Circle are notified as reserve forests. The main forest types includes tropical wet evergreen forest, tropical semi – evergreen forests and Southern tropical moist deciduous forest. There are a total of 26 tribal Vana Samrakshana Samithy (VSS) in Central Forest Circle. VSS helps in empowering the tribal communities in participation in forest management programmes and also helps to nurture the co-operation in community which helps them to solve their basic livelihood problems. In Central Forest Circle, no previous studies regarding the monitoring of the impact of PFM on livelihoods are available till now. Hence, the study was undertaken with the following specific objectives:

1. To understand the impact of PFM activities on the livelihood of indigenous people.

2. To attempt a perception analysis to know the pre and post PFM changes in livelihood due to PFM as perceived by the community.

Review of Literature

2. REVIEW OF LITERATURE

Joint forest management (JFM) is an important initiative taken by forest department in collaboration with the local communities in protection and management of forest. It has contributed to regeneration and restoration of forests (Pandey, 2005). JFM has great potential of success in forest degraded areas. Scarcity of resources motivates people in that area to participate in joint forest management. So resource depletion can be considered as an important factor which is responsible for the success of JFM. Other factors include generation of additional income, granted rights to forest use, employment opportunities etc. Generation of income and employment opportunities will reduce the dependence of local communities on forest and its resources. Granted rights to forest use make foresters realise about the rights of local communities to access forest resources to sustain their livelihoods. JFM is a co-management activity for sharing of benefits, responsibilities, decision – making among forest department and local communities. Lack of interaction among the forest user groups and department officials in the past is an important drawback of failure of JFM (Sood and Gupta, 2007).

2.1. JOINT FOREST MANAGEMENT IN INDIA

In India, Government policies and approaches plays an important role in success of JFM. Government policies encourage social initiatives. Actually in every community related programmes, social factors inhibit the effective implementation of the programme. So the government policies which support community actions are needed (Saxena, 1997). Before the implementation of Joint Forest Management, commercial forestry and the source of income from it were given importance. The need of meeting the livelihoods of people are not even considered. The products were also exported to other places and sold in order to get additional income. Thus people started to depend on forest for meeting their basic livelihoods. This was the reason for forest degradation and deforestation which actually led to the decrease in forest cover. Forest department officials

blamed local people for forest degradation. But the cause for their change in attitude has not realized. Lack of policy and rules has affected the life of people miserably. By all these, the relevance of participation and support of people in management and protection of forest has understood. Also the relevance of joint participation of local community with the forest officials in such activities also understood. Hence, Government of India started social forestry initiatives to increase the involvement of people in afforestation programmes. Since it is a failure, the need of conversion of the programme to a participatory approach has realized. National Forest Policy of 1988 emphasized the role of participation of people in management and protection of forests. The basic objective of policy is to maintain environmental stability through preservation of forests. Prior to this, Government of India issued guidelines of JFM which created massive people's movement and encouraged the participation of local communities. (Balooni, 2002). Through JFM programme, the involvement of local people in protection and development of forest has facilitated. But the need to study the impact is not given importance (Murali *et al.*, 2002). After initiating JFM programmes in India, many states had conducted evaluation studies of JFM regarding its strengths and weaknesses. A number of protection committees to execute JFM were formed. But some forest protection committees had not functioned properly. Lot of effort is needed to overcome the weaknesses of some forest protection committees. For the effective functioning of JFM, community participation, leadership quality of the people, institutional supports etc. are to be improved. Local communities should be made aware of the existence of JFM (Murali *et al.*, 2003). People were given access to the forest areas under JFM for collecting the non-wood forest produces and a percentage share of benefit was given to them. The innovative experiments of JFM were first carried out in 1972 at Arabari village in West Bengal. States in India which received assistance witnessed large rate of growth of JFM than those states which did not receive assistance. Implementation of JFM in India has successfully carried out the reestablishment of customary relations and livelihood rights of the people (Vemuri, 2008). JFM resembles the idea of collaborative forest management. Under JFM, forest management units are

formed at village level such as joint forest management committee, forest protection committee, eco-development committee etc. Each and every family living near the forest is eligible for the membership in these committees. The rights and duties regarding the management of forests are assigned to the members of these village communities, but the land ownership remains with the forest department. The members of these committees can have free access to the forest for collecting minor forest produces and the benefits are equally distributed among them (Kumar and Kant, 2016).

2.2. PARTICIPATORY FOREST MANAGEMENT IN KERALA

According to (Masuda et al., 2005), in Kerala joint forest management (JFM) is known as participatory forest management (PFM). In India, JFM was expanded to many states since 1990. In Kerala, it was established in 1998. Financial assistance from World Bank leads to the rapid initiation of the PFM programme. Implementation of PFM improved the livelihood and living conditions of the people. Forest conditions are also improved. The implementation body of PFM is Vana Samrakshana Samithy. At least 33% of the executive committee members must be women as per the guidelines of PFM. PFM expanded rapidly in Kerala because of less deforestation problems because of better management practices. According to Raghavan (2014) in her study conducted at Attapady, the performances of VSS on forest protection aspects are encouraging. The success of PFM programmes depends upon the socio-economic status and social participation of local communities. The constraints which can lead to failures are lack of communication between the members, lack of integration with other departments, political interference etc. Socio-economic variables such as education, income, occupation, participation also influences local people. The co-managed activities increased the household income and participation of women. Income is related to their livelihood opportunities. Participating in co-managed programme changed the attitude of the communities towards forest and forest department. VSS activities made a positive impact on reducing the crime rate in the forest. VSS activities are more focussed on forest

protection. Santhoshkumar (2008) opined that JFM had influenced the tribal communities in a positive way by changing their attitudes towards forests and forest department in Attapady. Most of them were aware of the forest laws after the implementation of JFM.

2.3. IMPACT OF PARTICIPATORY FOREST MANAGEMENT ON LIVELIHOODS

One of the stated objectives of JFM apart from improving forest cover is livelihood improvement. Studies on monitoring the impact of livelihood are very rare. Studies by Pandey (2005) suggested that JFM activities in all the villages in Rajasthan are consistent and positive. Monitoring the activities in an institution is necessary for the successful livelihood outcome. JFM had a positive impact on the rural livelihoods of the villages in Rajasthan. Availability of livelihoods motivates people to protect the forests. JFM should be linked to the livelihood needs of the people. Under JFM initiative, all the forests in India should be managed by participatory approaches to reduce poverty and to empower the local communities by ensuring their livelihood needs (Mir *et al.*, 2014). Das (2013) opined that expanding participatory forestry programme was needed for attaining livelihood security among poor households. For the success of this programme, the local communities and forest department should participate equally by setting a common goal. Natural capital and social capital can play an influential role in this regard. Assessment of livelihood security can be done based on the strength of various livelihood assets and its improvement. According to Sreejisha (2014), sustainability of livelihoods are an important issue. Lack of traditional ecological knowledge in the present generation is an important cause of over-utilization of forest resources. Over-utilization results in reduction and extinction of resources in future. Protection of common pool resources can only be possible through the interaction and combined effort of communities. Livelihood transformation resulted in social changes. This led to migration of local communities to the outside areas. This will also lead to cultural changes.

According to Pandey (2005), sustainable livelihood frame work is the most appropriate method to study the impact of JFM on livelihoods. This paper focuses on the monitoring of the livelihood impacts of JFM in Rajasthan through livelihood assessment process based on impact pathways. The study found that the impacts of JFM activities in all the selected villages are consistent and are mostly positive. But there are wide variations when comparisons are done among the five capital assets. The study suggested that the monitoring of the impact and perception analysis among the local communities would help in understanding the issues related to the implementation of JFM and could reach up to a suitable remedy for the concerned issue. Scoones (1998) opined that sustainable livelihood framework in combination with analysis from participatory field helps in identifying the issues and challenges of the areas selected and thus common goals can be achieved. Foster (2001) suggested that the strength of sustainable livelihood framework approach is that it reflects the range of assets and activities on which people depend for their livelihoods. It helps to recognise the problems poor people faces in meeting their livelihoods. This framework not only covers only specific fields like health, education etc. but also covers the entire assets which contributes to their living in the form of the five capitals. It also suggests the way to improve such conditions. This is because the problems faced by the local communities was not just low income, but also includes other factors such as illiteracy, poor health, lack of social awareness etc.(Krantz, 2001). According to Farrington *et al.* (1999), this frame work helps in understanding different perspectives of poverty experienced by the local people and to identify the constraints related to the livelihood improvement. This approach is suitable for the improved understanding of livelihoods and poverty and analyses the people's livelihoods and the change over time. It fully involves people and helps to achieve the livelihood goals and seeks to know the livelihood related opportunities and constraints. Peterson (2010) observed that livelihood strategies are the way in which people achieve their desired livelihood. It depends on the different kinds of assets available to them. It also depends on the possibilities and constraints of the strategies they use which was created by the structures and processes in a given

society and through these strategies, people achieves livelihood outcomes. Sustainable livelihood approach was an important analytical tool to observe the inter relationship between different components. So in a psychological point of view, if empowerment in a society is needed, the participation of people in all phases of development work should be ensured.

2.4. PERCEPTION STUDIES ON PARTICIPATORY FOREST MANAGEMENT

According to Rishi (2002), the people have positive opinion about joint forest management. Both forest officials and local people faced problems and constraints while implementing joint forest management. As per their perceptions, poverty, limited role of women and busy schedule of forest personnel were regarded as the main constraints in common. Illiteracy and ignorance were the important constraints for local people where as political interference, caste conflicts, limited decision making power of forest staff, and desire of villagers for immediate benefit from joint forest management, limited motivation of people were the main constraints faced by forest officials. The study suggested that the success of joint forest management cannot be achieved without the joint involvement of forest officials and local people as it also helped them to improve the relationship between the two. Sahu and Mohanty (2012) opined that co-operation among different stakeholders was the key to success of joint forest management. So the co-operation among different stakeholders has a critical significance. Also, a good forest governance was necessary for forming new ideas leading to more improvisation. A study was conducted by Chandran (2015) to understand the communication challenges in joint forest management was attempted. Due to lack of adequate mechanisms, the efforts taken by forest department to improve communications were not successful, which may be due to the lack of a proper institutional body. He reported that local people should be given the chance of addressing their issues. Lots of changes are occurring in tribal villages due to emerging technologies.

Materials and Methods

3. MATERIALS AND METHODS

3.1. STUDY AREA

3.1.1. Location

The present study entitled 'Impact of participatory forest management on livelihoods of indigenous communities' was carried out at Central Forest Circle, Thrissur (Fig 1) which includes the four forest divisions Vazhachal forest division, Chalakkudy forest division, Malayatoor forest division and Thrissur forest division. Vazhachal forest division is located at 10°5 ½" and 10°23" North latitude and 76° 9" and 76°52 ½" East longitude, which consists of an area of 413.94 sq. km. . Kadars and Malayars are the tribal groups present in the forest division, who mostly depends on forests for their livelihood. Chalakkudy forest division is located at 10°23' North latitude and 76°32' East longitude, which consists of an area of 279.71 sq.km. Malayatoor forest division is located at 10°10' North latitude and 76°30' East longitude, which consists of an area of 467.10 sq.km . Muthuvans, Malayarayans and Mannans are the main tribal groups present. Thrissur forest division consists of forest area of 210.64 sq.km. Malayans are the main tribal groups present .

3.2 SELECTION OF SAMPLE

Five Tribal Vana Samrakshana Samithies(TVSS) which are active were randomly selected from the four forest divisions. Distributed among the four forest divisions, there are 26 Tribal (Table 1) Vana Samrakshana Samithies. The selected tribal VSS include Vazhachal, Anapantham, Karikadavu, Kunchipara and Poovanchira (Table 2).

Table 1. Tribal VSS in Central Forest Circle

Sl no	Tribal VSS	Range	Division
1	Poovanchira	Pattikkad	Thrissur
2	Thamaravellachal	Pattikkad	Thrissur
3	Vazhachal	Charpa	Vazhachal
4	Pokalappara	Vazhachal	Vazhachal
5	Malakkappara	Sholayar	Vazhachal
6	Thavalakuzhippara	Sholayar	Vazhachal
7	Sholayar	Sholayar	Vazhachal
8	Vachumaram	Kollathirumedu	Vazhachal
9	Anappandam	Vellikulangara	Chalakkudy
10	Karikadavu	Vellikulangara	Chalakkudy
11	Thanittampara	Pariyaram	Chalakkudy
12	Chakkiparambu	Palappilly	Chalakkudy
13	Elekode	Palappilly	Chalakkudy
14	Pillapara	Pariyaram	Chalakkudy
15	Nayana	Palappilly	Chalakkudy
16	Ponganchuvadu	Thundathil	Malayatoor
17	Thakumkandam	Thundathil	Malayatoor
18	Vellaramkuthu	Kuttampuzha	Malayatoor
19	Thalavachappara	Kuttampuzha	Malayatoor
20	Kunchipara	Kuttampuzha	Malayatoor
21	Uriyampetty	Kuttampuzha	Malayatoor
22	Medanappara	Kuttampuzha	Malayatoor
23	Kappayam	Idamalayar	Malayatoor
24	Adichilithotti	Idamalayar	Malayatoor
25	Thera	Idamalayar	Malayatoor
26	Variyam	Idamalayar	Malayatoor

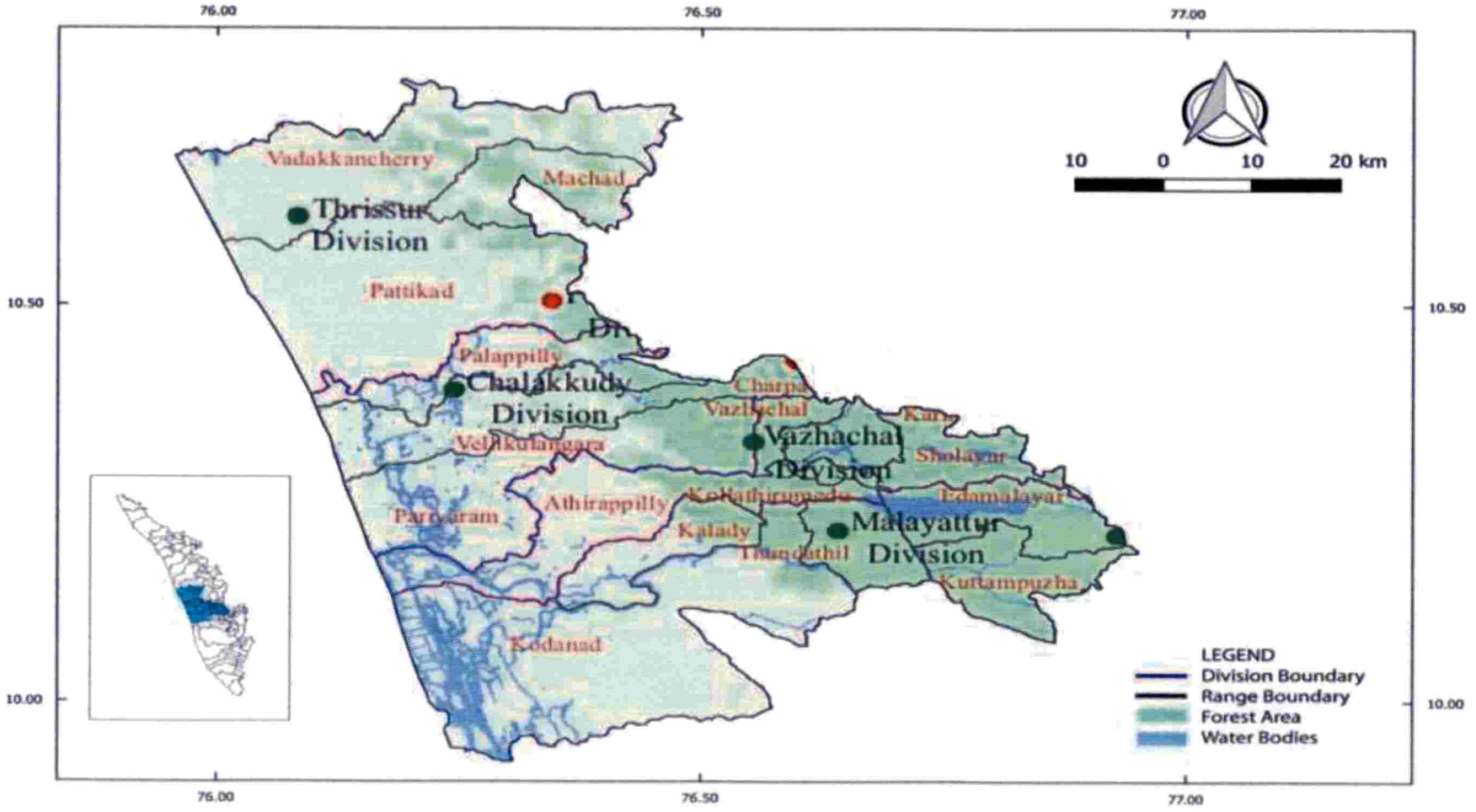

Fig 1. Map of Central Forest Circle (Study area)

Table 2. TVSS selected for the study

Sl. no	Tribal VSS	Range	Forest division
1	Anapantham	Vellikulangara	Chalakkudy
2	Karikadavu	Vellikulangara	Chalakkudy
3	Poovanchira	Pattikad	Thrissur
4	Kunchipara	Kuttampuzha	Malayatoor
5	Vazhachal	Charpa	Vazhachal

3.3 DATA COLLECTION

3.3.1. Impact study

3.3.1.1. Selection of respondents

A detailed interview schedule was prepared for collecting the data. The data was collected from forest department officials, VSS secretary, VSS president, VSS executive committee members and local people.

3.3.1.2. Interview Schedule

The preparation of Interview schedule for the study of impact of PFM on livelihoods was done by using sustainable livelihood framework. This framework identifies five core assets which constitutes the livelihood building blocks: financial capital, physical capital, human capital, natural capital and social capital. These capitals are interrelated to each other. The assumption is that people achieve livelihood outcomes by depending on a range of assets for undertaking different activities. The activities they adopt to achieve the outcomes will depend upon their preferences. In short, their living conditions determine their access to assets and livelihood opportunities and the way in which these can be converted into outcomes. Indicators for the five capital assets can be derived by using the

impact pathways (Fig 2). The details of the interview schedule is given in Appendix-1. The data before implementation of PFM and after implementation of PFM was collected for the comparison.

3.3.1.3. Financial capital

It comprised of wage rates per day, number of days of work availability, savings, and other cash assets. PFM was expected to increase its earnings through consumption and sale of forest products from employment generating activities.

3.3.1.4. Physical capital

It is the capital created by people themselves. It included houses, vehicles, transport infrastructures, communication facilities etc.

3.3.1.5. Human capital

It consists of people's education, knowledge, skills, information, health etc. PFM is expected to increase in enhancing their knowledge through education and training and providing better medical facilities.

3.3.1.6. Natural capital

It refers to the forest, land, water, environmental services available to the people etc. Conservation of natural capital is one of the key aims of PFM apart from livelihoods improvement.

3.3.1.7. Social capital

This capital concerns about the institutions that helps to maintain and develop human capital in partnership with others. For example, communities, committees, trade unions, organisations etc. It includes networks, groups and trust.

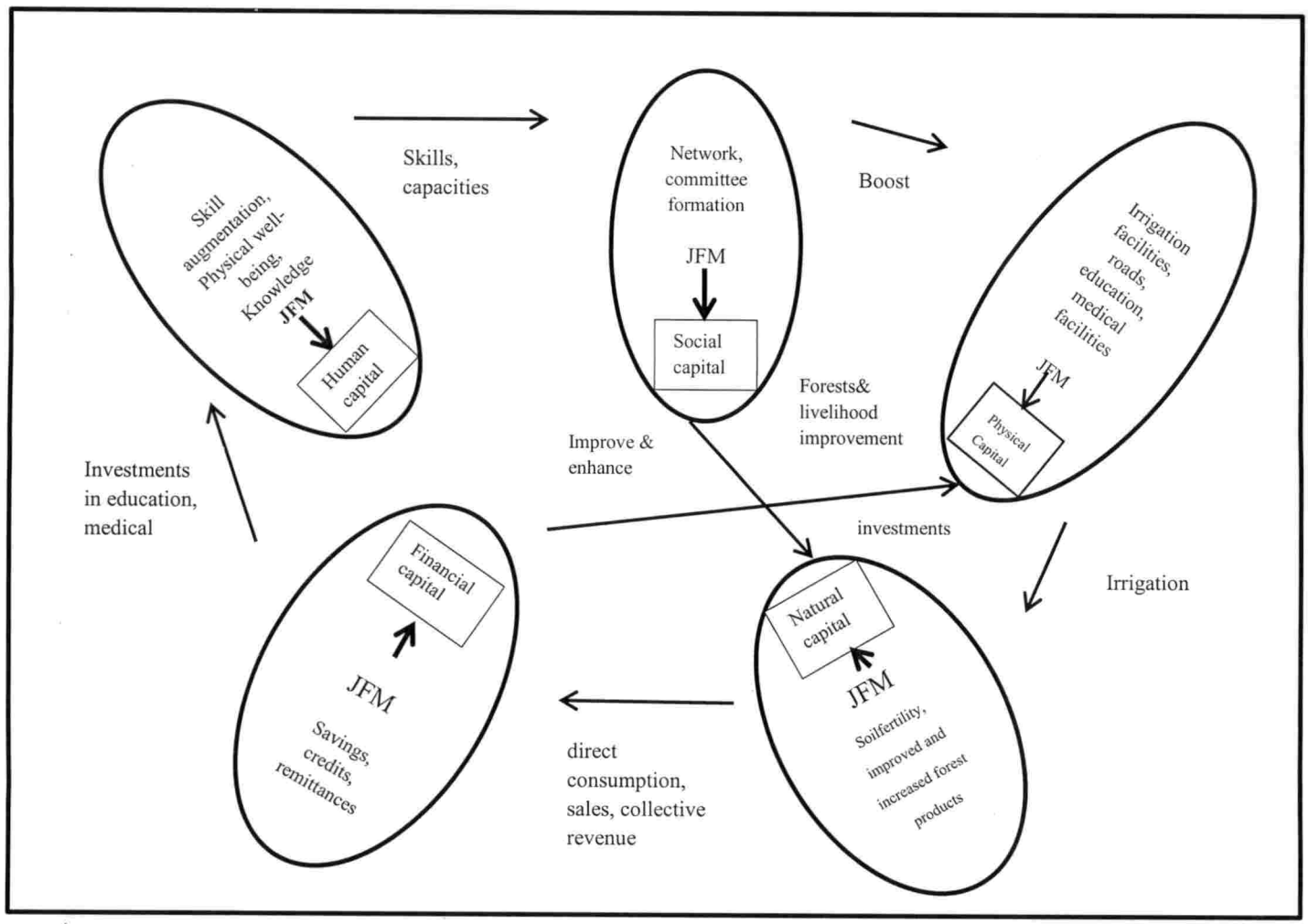

Fig 2. Livelihoods Improvement Impact Pathways modified after Belcher(2005)

3.3.2. Perception analysis

Perception analysis was done by assessing the change in pre- PFM and post-PFM conditions of 22 indicators which is derived from information collected in the form of secondary data and also by examining the study area. A minimum of 30 respondents from each VSS was interviewed for collecting the data. The 22 indicators were divided into three aspects namely ecological (Table 3), institutional (Table 4)and participatory (Table 5) aspects of perception study. It was done for analysing the respondent's knowledge about the participatory forest management activities and their adaptation to the changes followed. The details of the interview schedule is given in Appendix-2.

Table 3. Ecological indicators used for perception study

Sl.No.	INDICATORS
1	Ecological condition of the forest (ecf)
2	Sustainable extraction of NTFPs (sue)
3	Illicit felling (ilfl)
4	Tree species diversity (trsp)
5	Incidents of forest fire (fofi)
6	Poaching (poa)
7	Encroachment (enc)

Table 4. Institutional indicators used for perception study

Sl.No.	INDICATORS
1	NTFP marketing (ntfp)
2	Awareness about the importance of conservation and protection of forest (awa)
3	Knowledge about tree nursery technology (nurs)
4	Managerial capacity (mage)
5	Individual decision making power (indi)
6	Job opportunities through NTFP collection (jntf)
7	Job opportunities through ecotourism (jeco)
8	Migration of people for jobs (mig)

Table 5. Participatory indicators used for perception study

Sl.No.	INDICATORS
1	Co-operation between forest department and local people (co)
2	Interaction between forest department and local people (int)
3	Participation of women (wom)
4	Child education (chld)
5	Overall education status (oved)
6	Health awareness (heal)
7	Overall standard of living (ovst)

3.4 DATA ANALYSIS

3.4.1 Impact analysis

Analysis of impact study was done by interpreting the interview schedule responses of the study through comparing the pre-PFM and post-PFM data with a standard data. The result produced through analysis is represented in the form of a radar diagram in which each of its end points represent any of the capital asset. Based on the indicators of each capital, the value of the scale varies. The data of pre-PFM and post –PFM can be represented in one diagram and the comparison of the situations were done through it. The analysis was done by using MS- excel.

3.4.2 Perception study

Analysis of perception study were subjected to statistical analysis by interpreting the interview schedule responses using descriptive statistics and multi- variate analysis to work out the contributions of the independent variables. The statistical software used was SPSS.

3.4.3. Scoring technique for the study

For impact study, the pre-PFM and post-PFM data was compared with a standard data corresponding to each of the situation. For example, in the case of financial capital, average wage per day during pre-PFM data and post-PFM data was compared with the standard average wage of a worker of those times. Likewise, all the other indicators in each of the capital were assessed. For perception study, 5 point scale of excellent, very good, good, fair and poor was used. The scoring of each of the indicators according to the responses of the people was given based on the scale (excellent = 1, very good = 2, good = 3, fair = 4 and poor = 5).

Plate 1: Data collection at Vazhachal VSS

Plate 2: Data collection at Kunchipara VSS

Plate 3: Data collection at Anapantham VSS

Plate 4: Data collection at Vazhachal VSS

Plate 4: Data collection at Karikadavu VSS

Plate 6: Data collection at Poovanchira VSS

Results

4. RESULTS

The present study was undertaken to obtain information about the impact of participatory forest management on the livelihoods of indigenous communities in Central Forest Circle, Thrissur. The study also attempted a perception analysis to know the pre and post PFM changes in livelihood due to PFM as perceived by the community. The results of this study are presented below.

4.1. IMPACT ANALYSIS OF THE FIVE VSS

The results of the impact studies on the five VSS using sustainable livelihoods approach framework is outlined below.

4.1.1. Anapantham VSS

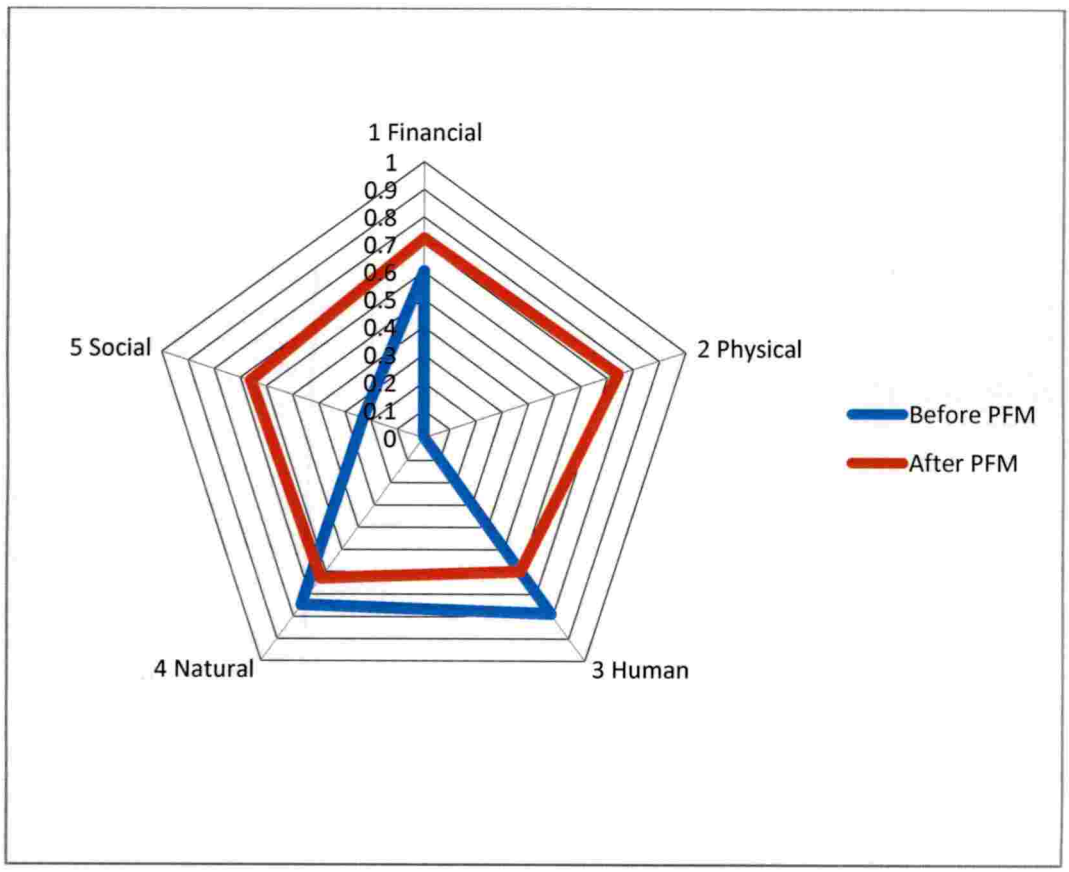

Fig 3. Radar diagram of PFM impacts on livelihood of Anapantham VSS

Fig 3 depicts the results of the impact analysis of Anapantham VSS by assessing the five capital assets. It can be seen that after the implementation of PFM activities the financial capital (from 0.6 to 0.72), physical capital(from 0 to 0.74) and social capital(from 0.23 to 0.66) has improved while the natural capital(from 0.75 to 0.63) and human capital(from 0.79 to 0.6) of this VSS has reduced than the pre-PFM situation.

4.1.2 Karikadavu VSS

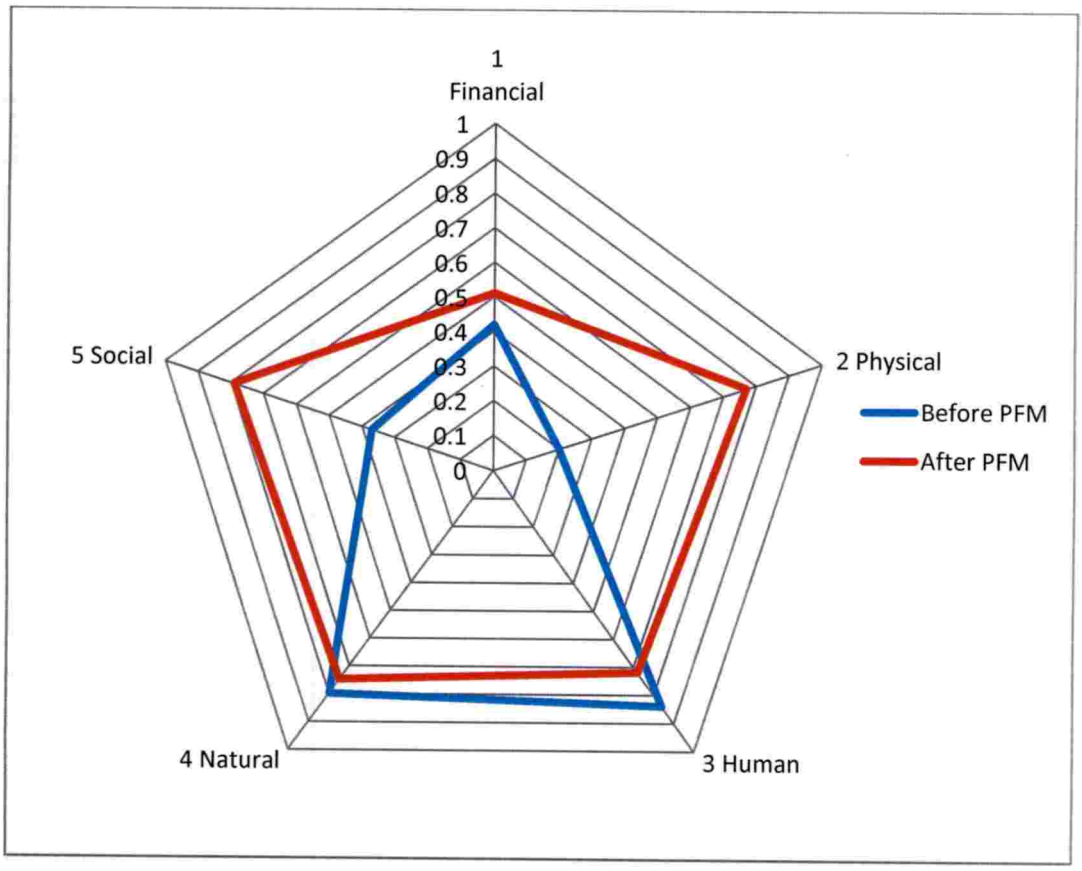

Fig 4. Radar diagram of PFM Activities on livelihoods in Karikadavu VSS

It is evident from Fig 4 that the PFM activities has improved the social capital(from 0.37 to 0.79), financial capital(from 0.42 to 0.51) and physical capital(from 0.2 to 0.77) of this VSS. At the same time, PFM activities has not elevated the natural capital(from 0.8 to 0.75) and human capital(from 0.84 to 0.72) of this VSS .

4.1.3. Kunchipara VSS

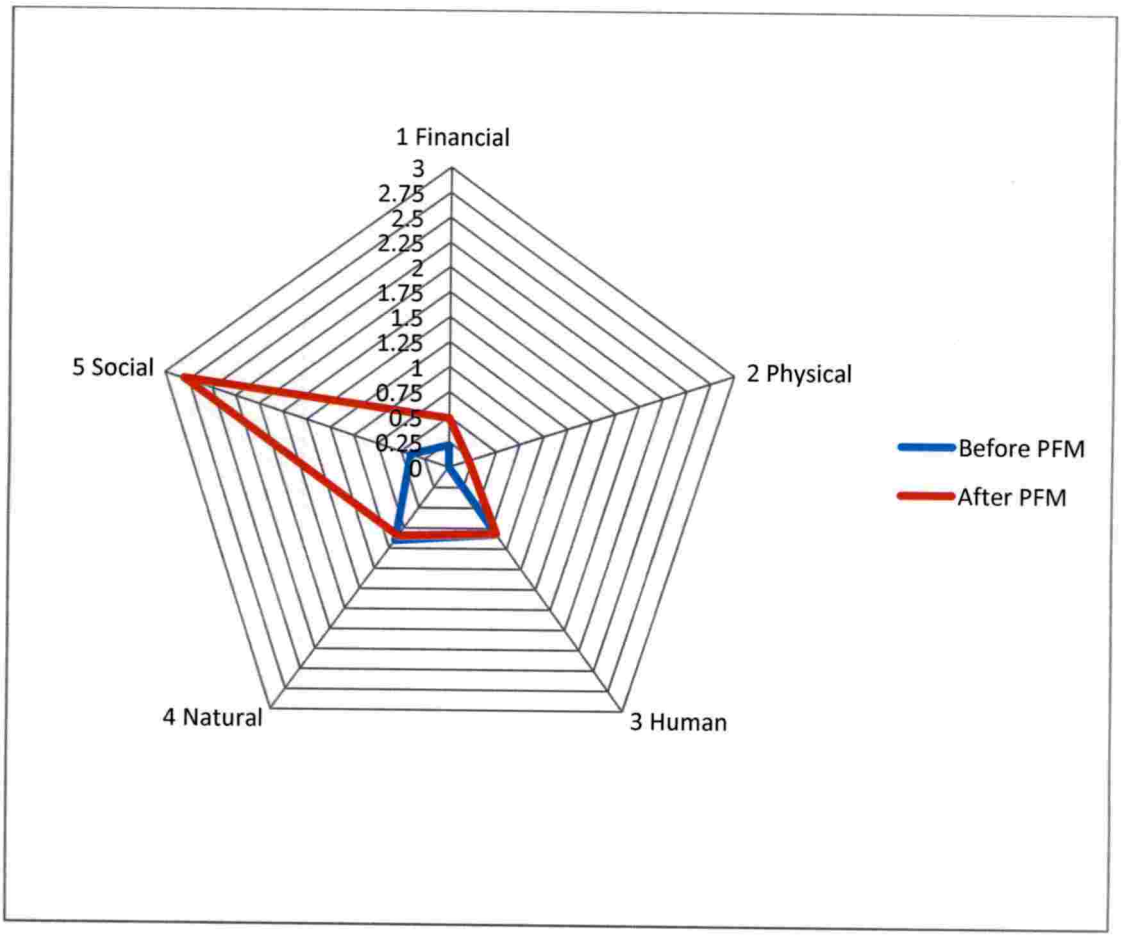

Fig 5. Radar diagram of PFM activities on livelihoods in Kunchipara VSS

Fig 5 shows the impact of PFM activities on the livelihoods at Kunchipara VSS. PFM activities has rained the physical capital (from 0 to 0.21) and financial capital (from 0.22 to 0.48). The social capital has substantially improved from 0.4 to 2.8. On the other hand, the human capital (from 0.82 to 0.82) was unaffected. Meanwhile, the natural capital has registered a decline from 0.9 to 0.85.

4.1.4. Poovanchira VSS

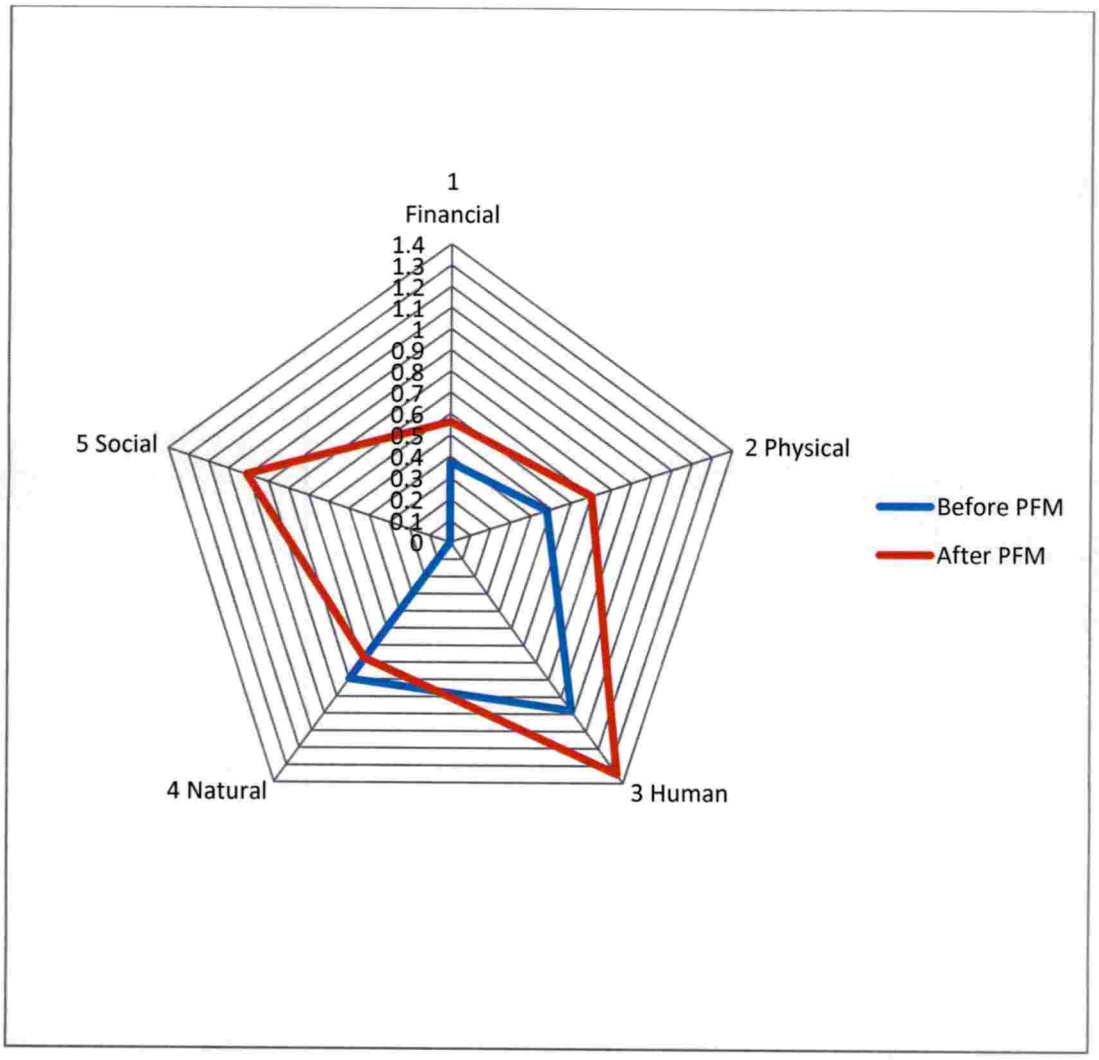

Fig 6. Radar diagram of PFM activities on livelihoods in Poovanchira VSS

Fig 6 shows that, at Poovanchira, the PFM activities has improved the financial capital (from 0.37 to 0.56), physical capital (from 0.48 to 0.7), human capital(from 0.98 to 1.35) and social capital(from 0 t0 1.01), while the natural capital has declined from 0.8 to 0.68.

4.1.5. Vazhachal VSS

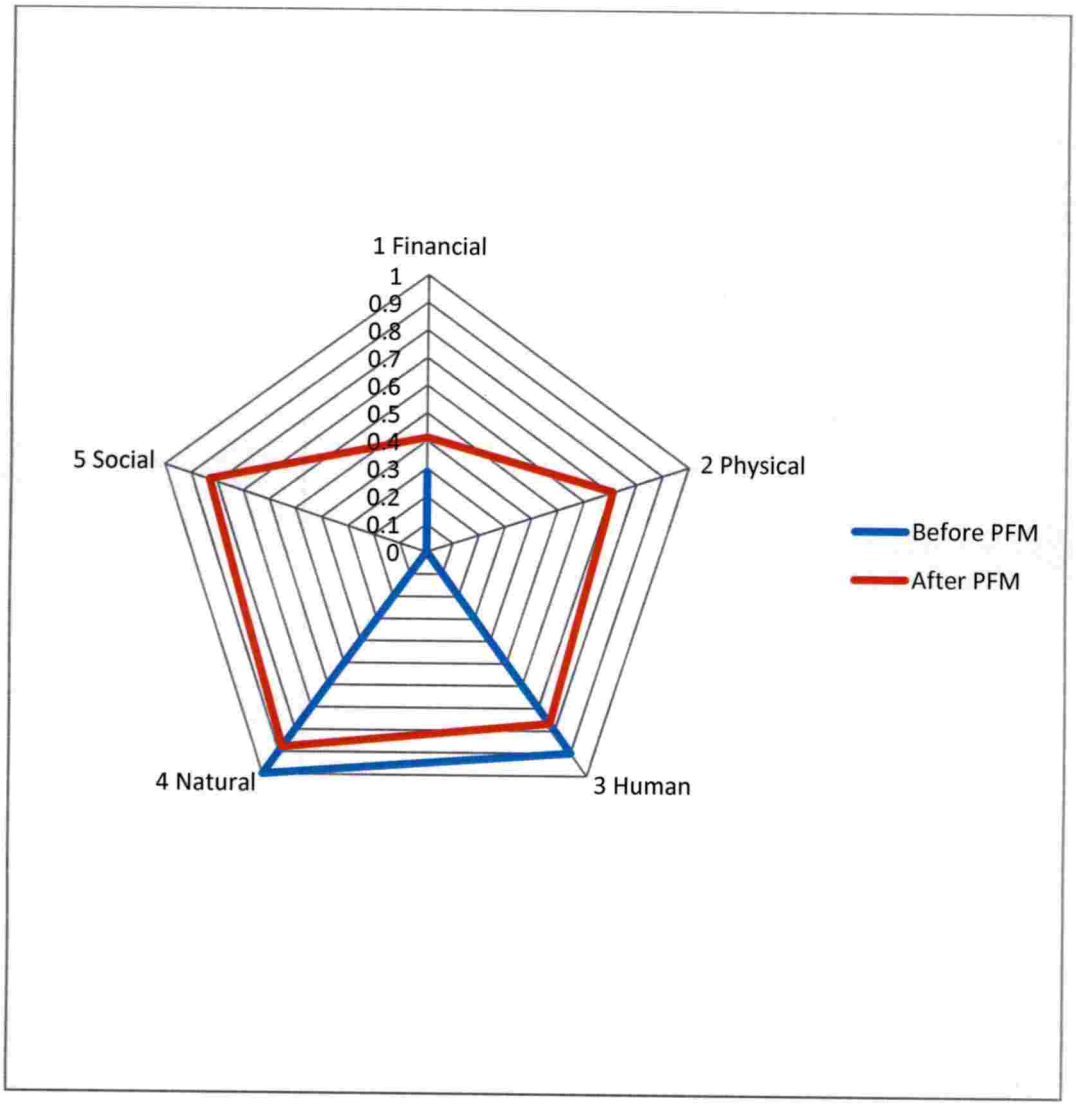

Fig 7. Radar diagram of PFM activities on livelihoods in Vazhachal VSS

From Fig 7, it is clear that the PFM activities had positive impacts on its financial capital (0.29 to 0.41), physical capital (from 0 to 0.71) and social capital (from 0 to 0.83). At the same time, the natural capital (1 to 0.88) and human capital (from 0.9 to 0.77) of Vazhachal VSS has registered a decline.

4.2 CAPITAL WISE PERFORMANCE OF PRE-PFM AND POST-PFM SITUATIONS IN THE FIVE VSS

The capital wise analysis of pre and post PFM situations in the five VSS is outlined below.

4.2.1. Financial Capital

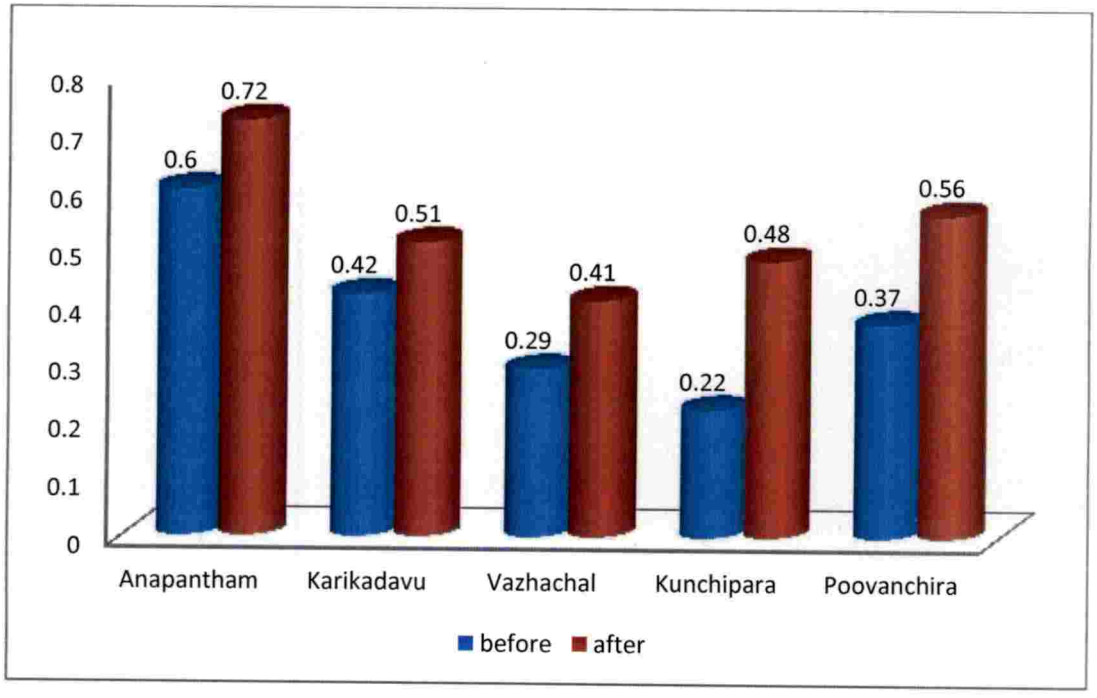

Fig 8. Performance of financial capital (pre-PFM and post-PFM situations)

Fig 8 shows the changes in financial capital of pre and post PFM situations in all the five VSS. It is evident that PFM activities have increased the financial capital in all the five VSS. Among the five, the highest change was registered in Kunchipara VSS (from 0.22 to 0.48) and the lowest variation was observed in Karikadavu VSS (from 0.42 to 0.51). In Anapantham VSS, the variation was 0.6 to 0.72, while at Poovanchira the variation was 0.37 to 0.56. In Vazhachal VSS, the variation was 0.29 to 0.41.

4.2.2. Physical Capital

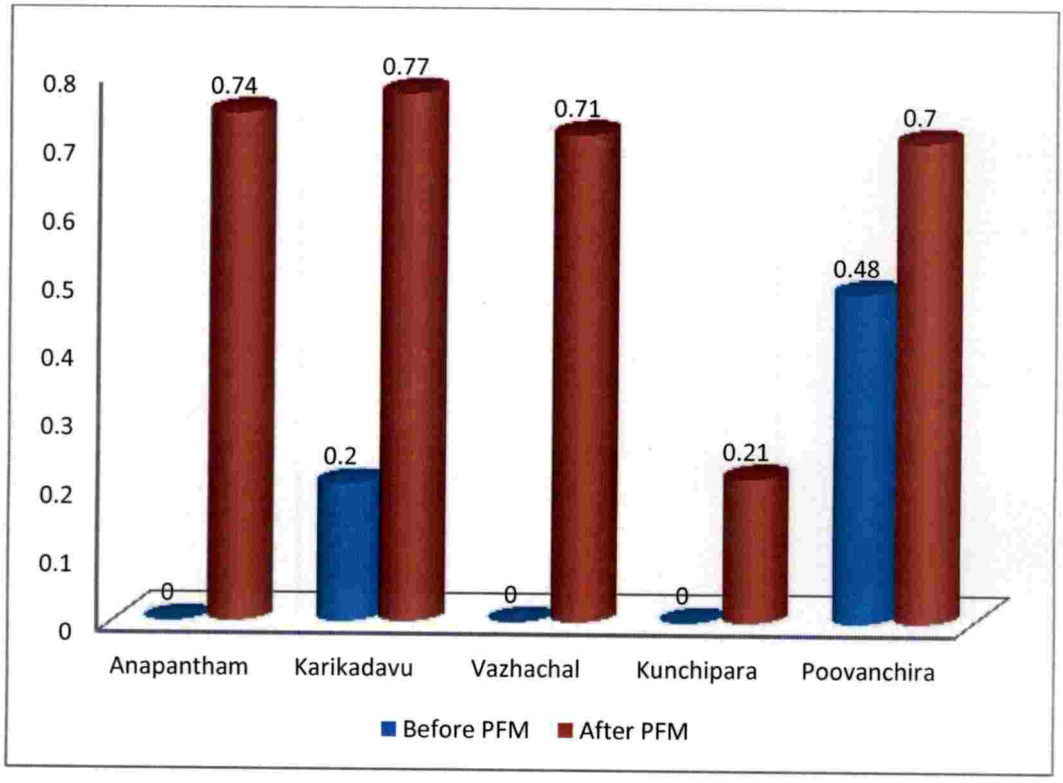

Fig 9. Performance of physical capital (pre-PFM and post-PFM situations)

Fig 9 shows the changes in physical capital of pre and post PFM situations in all the five VSS. It is evident that PFM activities have increased the physical capital in all the five VSS. Among the five, the highest change was observed in Anapantham VSS (from 0 to 0.74) and the lowest variation was in Kunchipara VSS(from 0 to 0.21) followed by Poovanchira(0.48 to 0.7). Vazhachal VSS registered large change from 0 to 0.71.

4.2.3. Human Capital

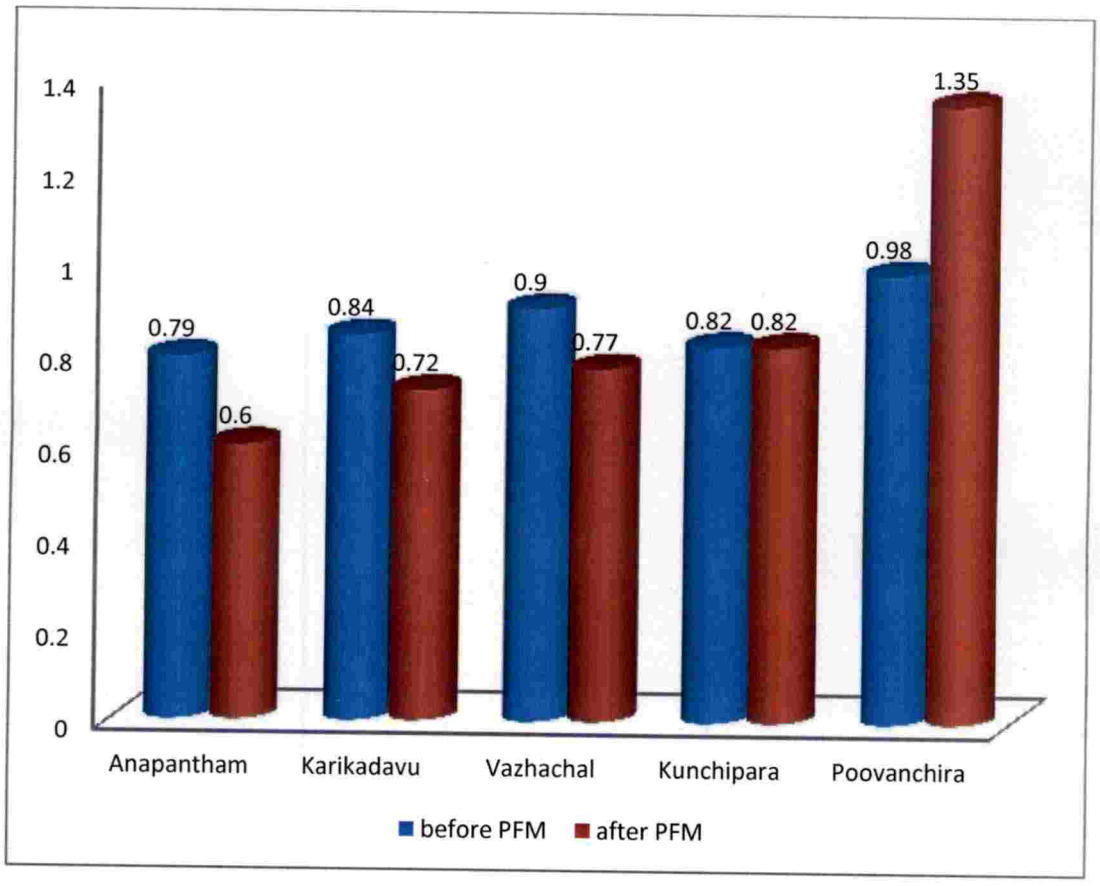

Fig 10. Performance of human capital (pre-PFM and post-PFM situations)

Fig 10 shows the changes in human capital of pre-PFM and post – PFM situations in all the five VSS. Human capital has shown a decline in most VSS. In Anapantham VSS (from 0.79 to 0.6), Karikadavu VSS(from0.84 to 0.72) and Vazhachal VSS(from 0.9 to 0.77), it registered a decrease. In Kunchipara VSS(from0.82 to 0.82) , the human capital remained the same. On the other hand, it increased in Poovanchira VSS from 0.98 to 1.35.

4.2.4. Natural Capital

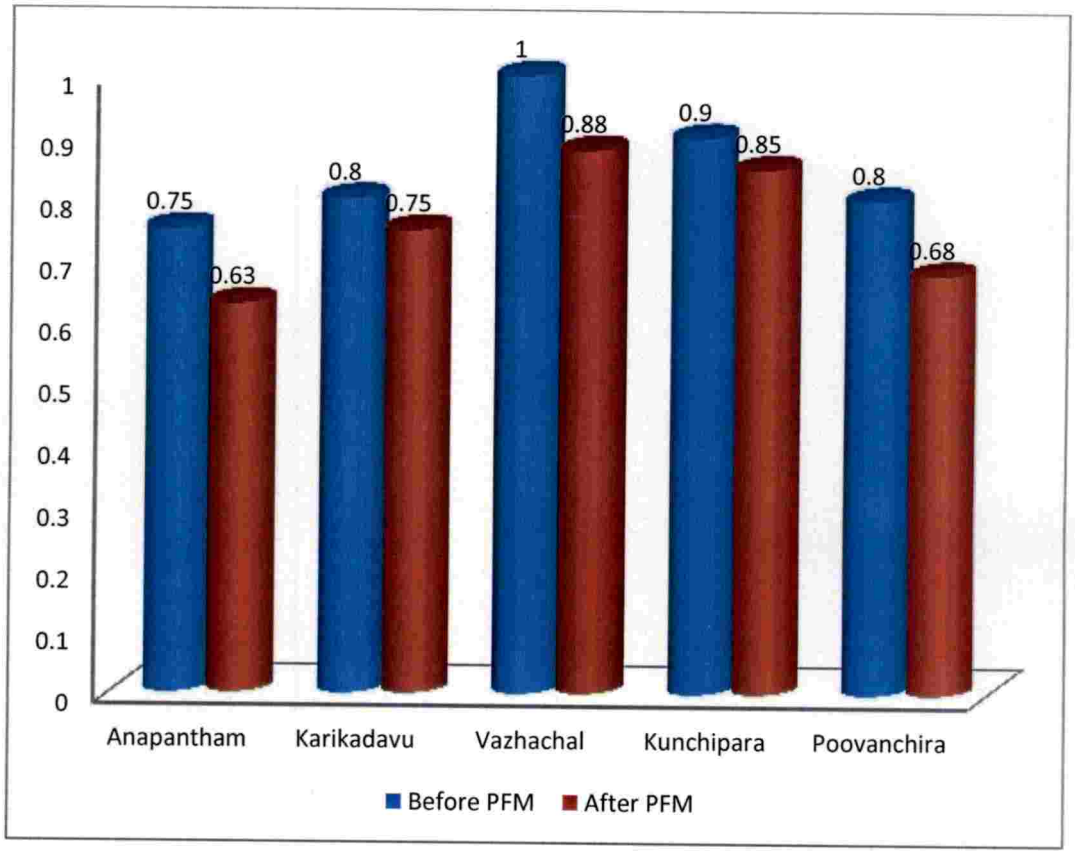

Fig 11. Performance of natural capital (pre-PFM and post-PFM situations)

Fig 11 shows the changes in natural capital of pre-PFM and post – PFM situations in all the five VSS. It is evident that the natural capital in all the five VSS has decreased. Among the five, similar rate of change were observed at Anapantham VSS(from 0.75to0.63), Vazhachal VSS(from 1 to 0.88) and Poovanchira VSS(from 0.8 to 0.68. In Kunchipara VSS (from 0.9 to 0.85)and Karikadavu VSS(from 0.8 to 0.75) the natural capital registered the lowest variation.

4.2.5. Social Capital

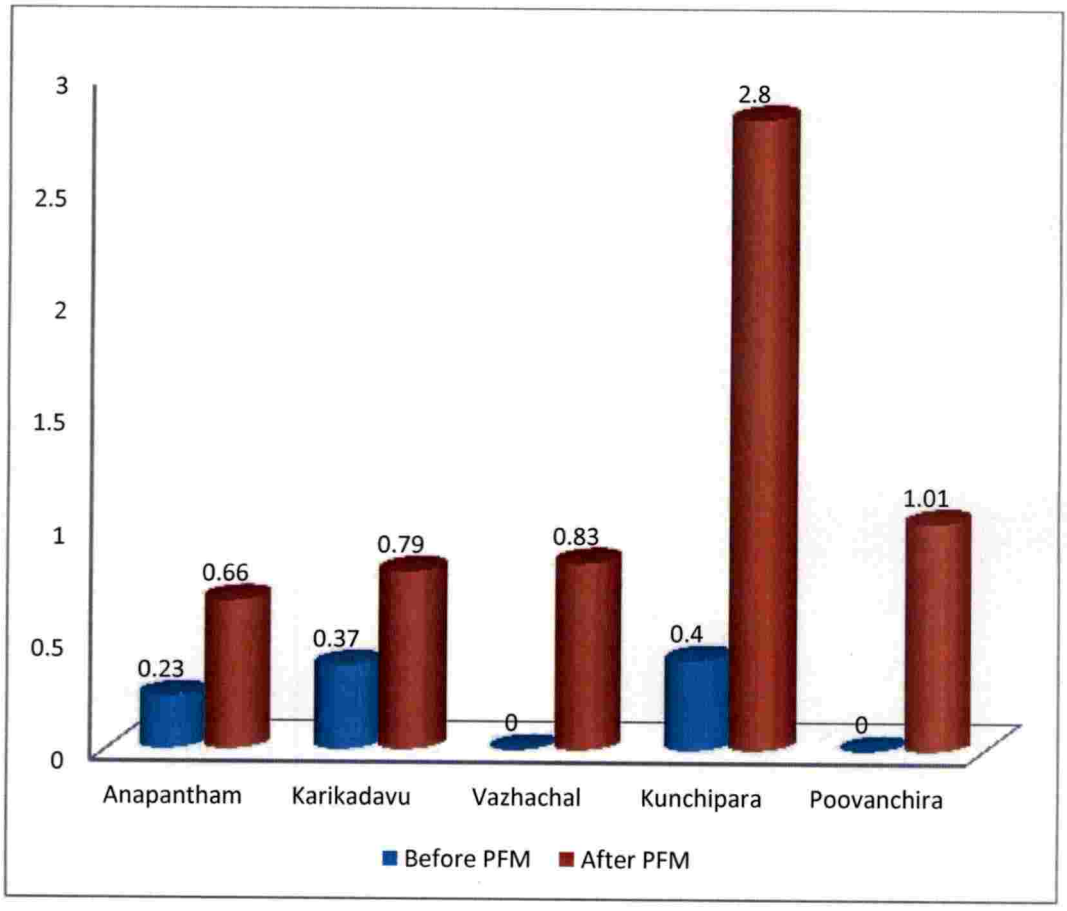

Fig 12. Performance of social capital (pre-PFM and post-PFM situations)

It can be seen from Fig 12, that the PFM activities has increased the social capital in all the five VSS. Among the five, the highest variation is shown in Kunchipara VSS(from 0.4 to 2.8) and the lowest variation is shown in Karikadavu VSS(from 0.37 to 0.79). Poovanchira VSS has also shown a greater change from 0 to 1.01. In Anapantham VSS, the variation was from 0.23 to 0.66, while at Vazhachal VSS, the variation was from 0 to 0.83.

4.3. FREQUENCY DISTRIBUTION OF THE RESPONSES OF THE PEOPLE IN ALL THE FIVE VSS

4.3.1. Anapantham VSS

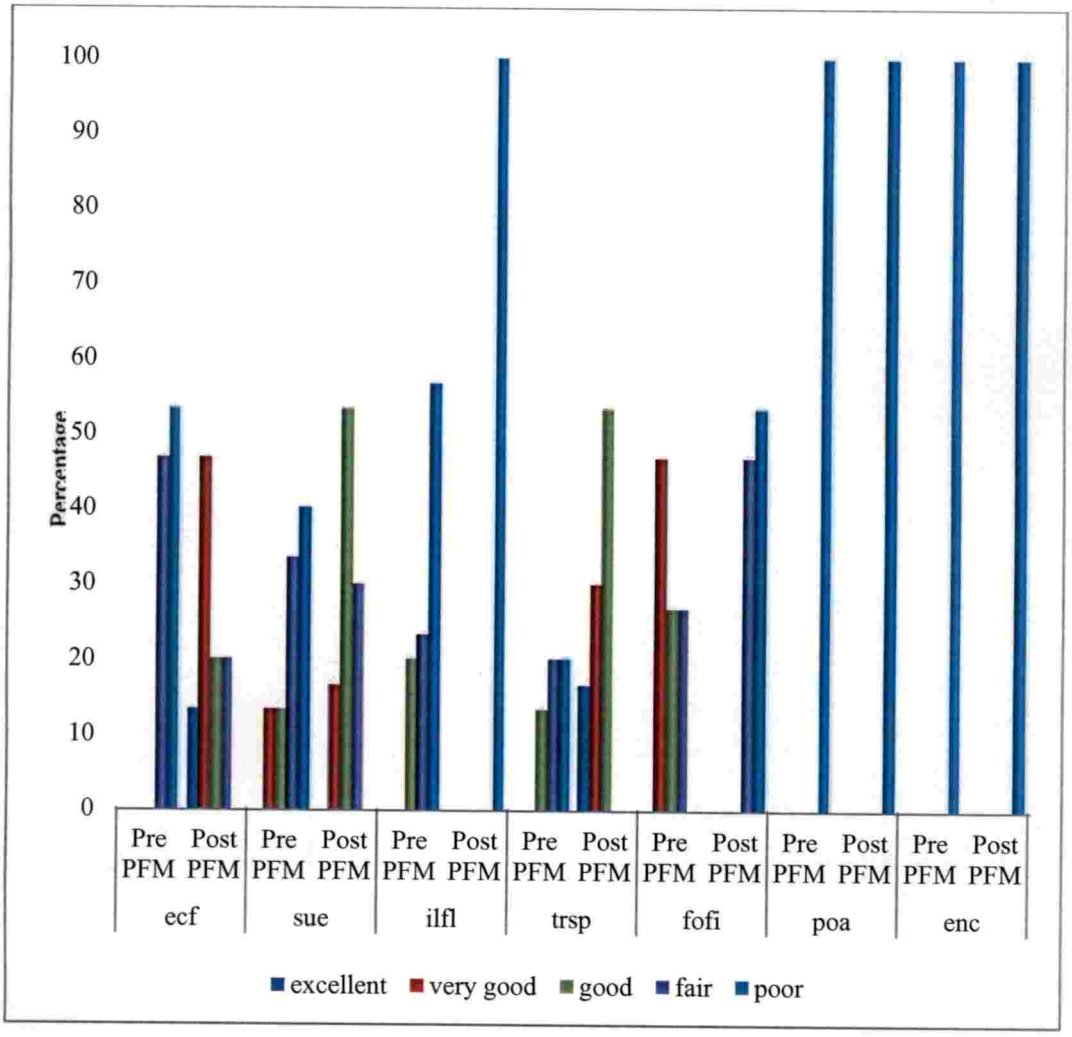

Fig 13. Responses to ecological indicators by Anapantham VSS

From Fig 13, it is clear that majority of people admitted that the ecological condition of forests was poor during pre-PFM period. Prior to PFM implementation, the NTFP extraction was not done in a sustainable manner, while cases of illicit felling were reported. The trees species diversity was good and forest fire incidents were there, while in post-PFM period, the conditions were reversed.

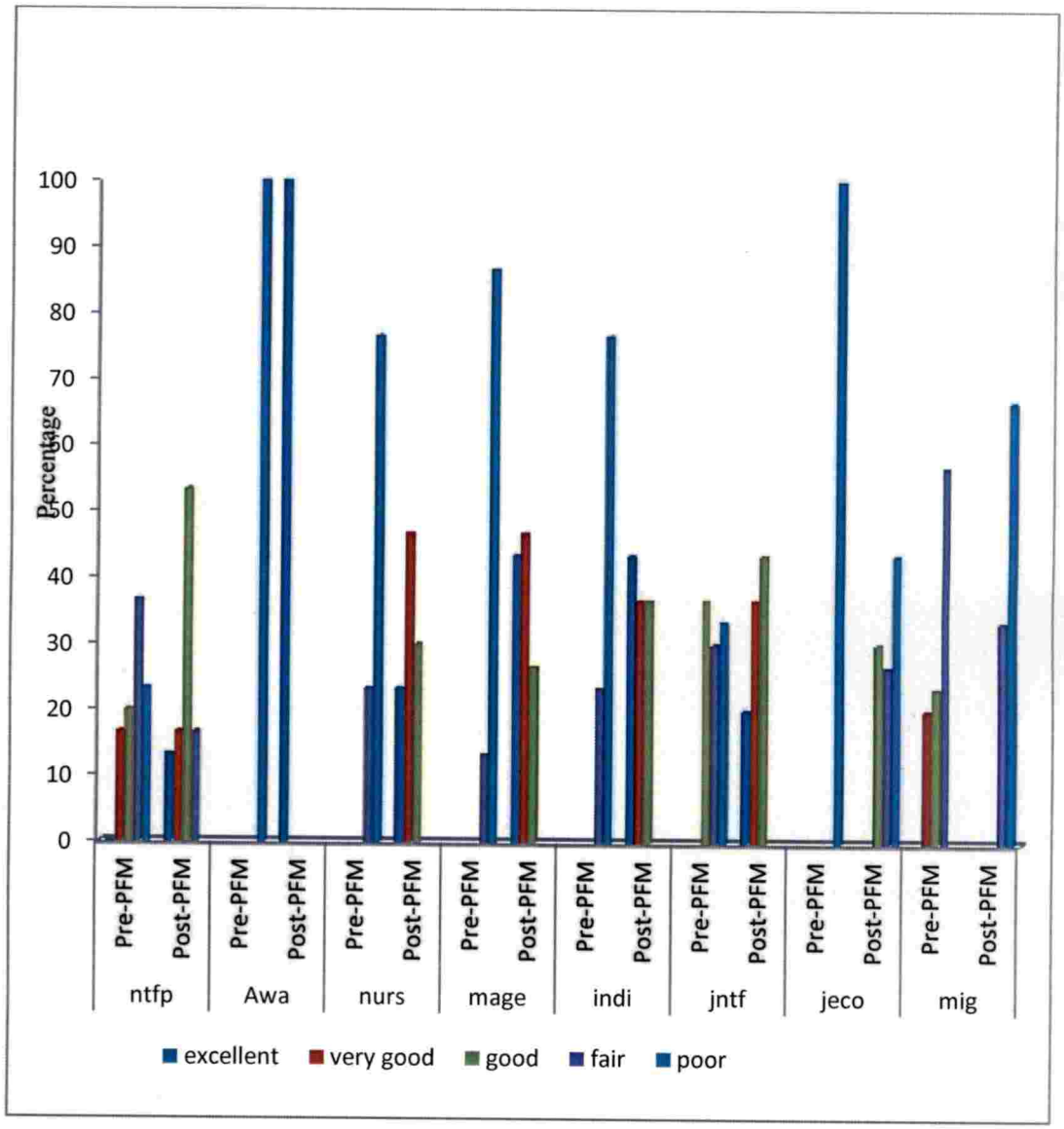

Fig 14. Responses to institutional indicators by Anapantham VSS

From Fig 14, it can be seen that, majority of the people admitted that awareness about protection and conservation of forests was poor in the pre-PFM period. After PFM implementation, it can be seen that the managerial capacity and individual decision making power of people improved.

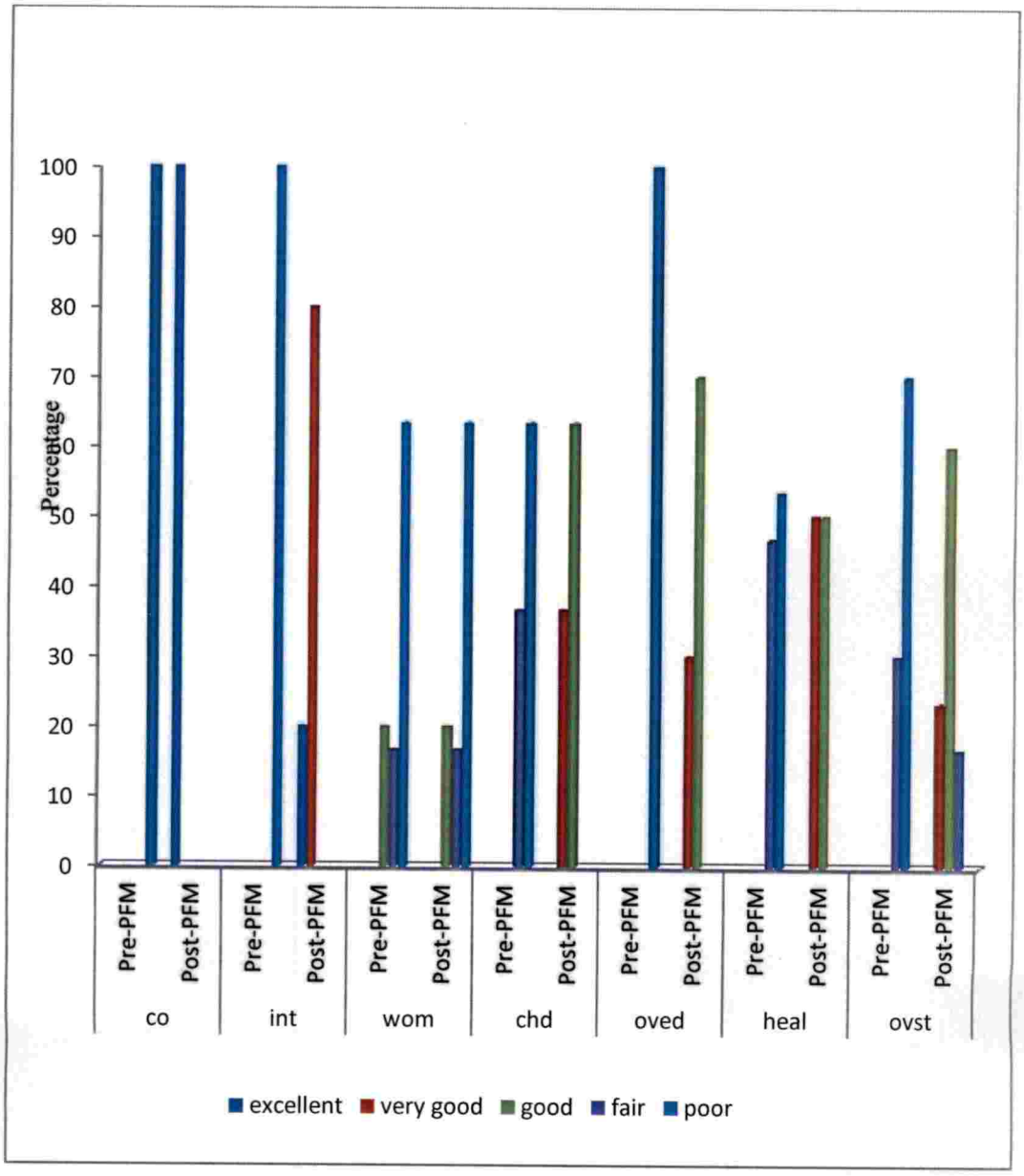

Fig 15. Responses to participatory indicators by Anapantham VSS

From Fig 15, it is clear that in the pre-PFM period, majority of people admitted that co-operation and interaction between local people and forest department officials was poor. The participation of women in forest management activities and programmes was also poor during the pre-PFM era. In post-PFM period, majority of people in Anapantham VSS were of the view that child education, overall education, awareness about health and overall living conditions improved.

4.3.2. Karikadavu VSS

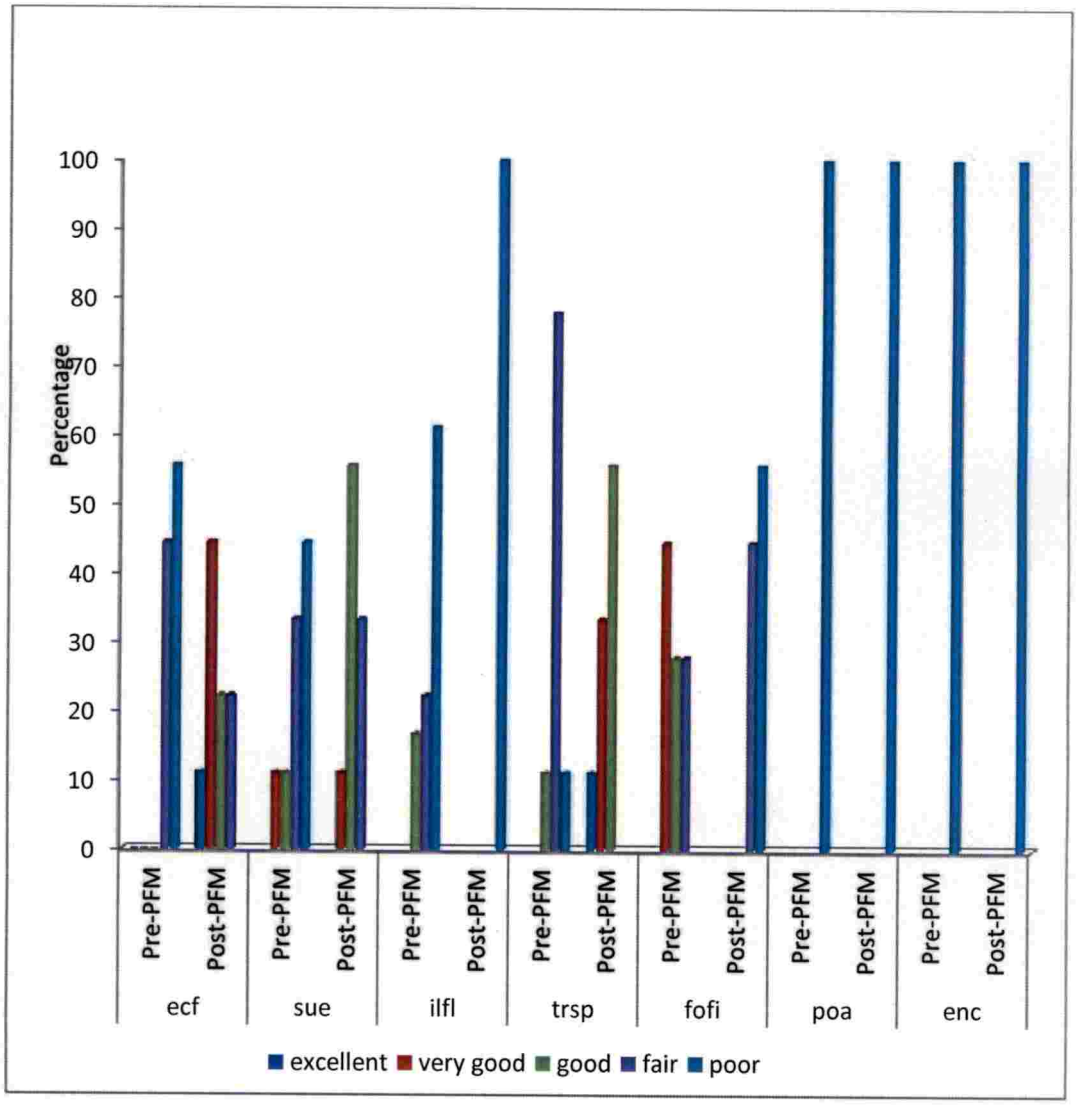

Fig 16. Response to ecological indicators by Karikadavu VSS

From Fig 16, it is clear that in pre-PFM period, the ecological condition of forests was poor. People had relatively poor ideas about and sustainable extraction of NTFPs. But in post –PFM period, majority of the people opined that ecological condition of forests improved and NTFP extraction began to be done in a more sustainable manner.

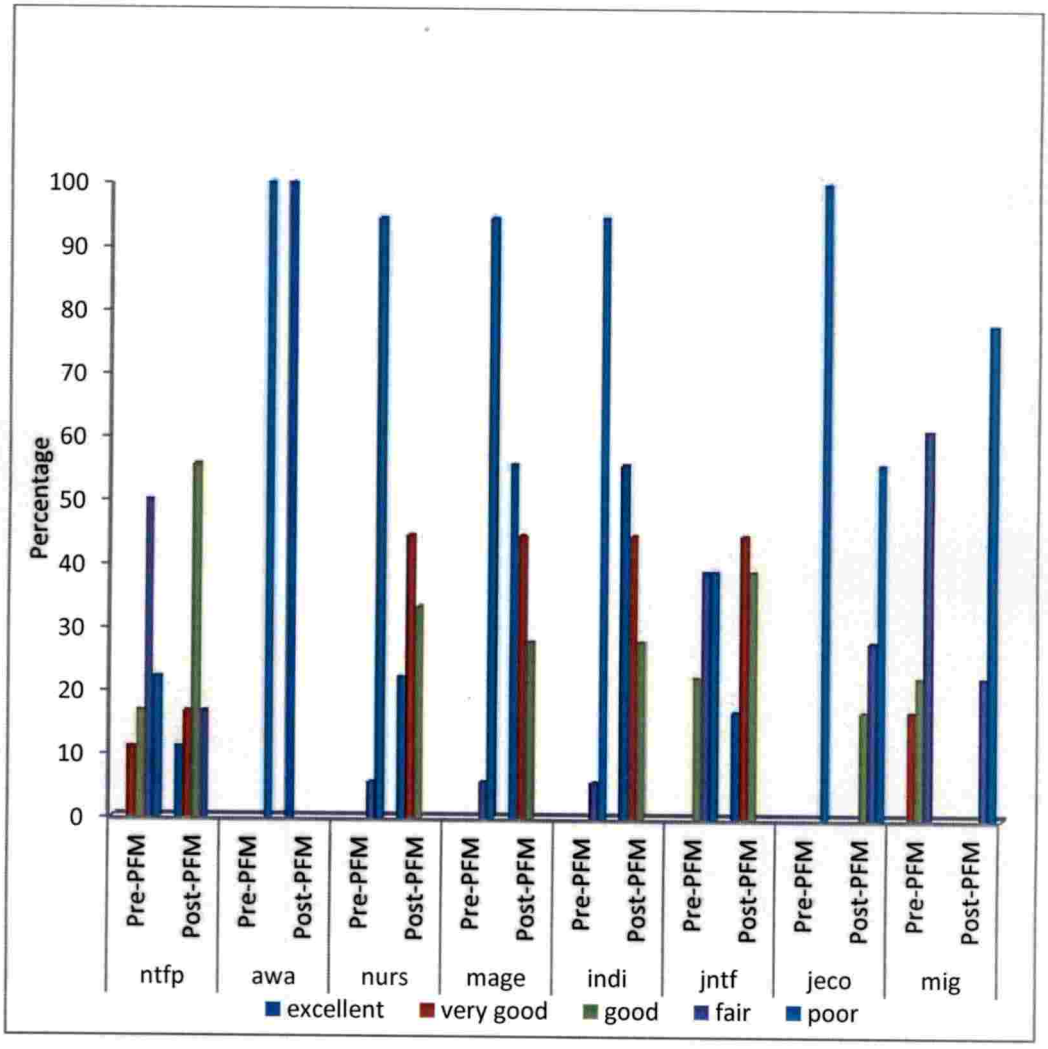

Fig 17. Responses to institutional indicators by Karikadavu VSS

From Fig 17, it is clear that in pre-PFM period, people had poor knowledge about tree nursery technologies and low awareness about protection and forest conservation. Their managerial capacity and individual decision making power was poor in the post-PFM period. These aspects improved after PFM implementation. Migration of people in search of jobs got reduced in the post-PFM period.

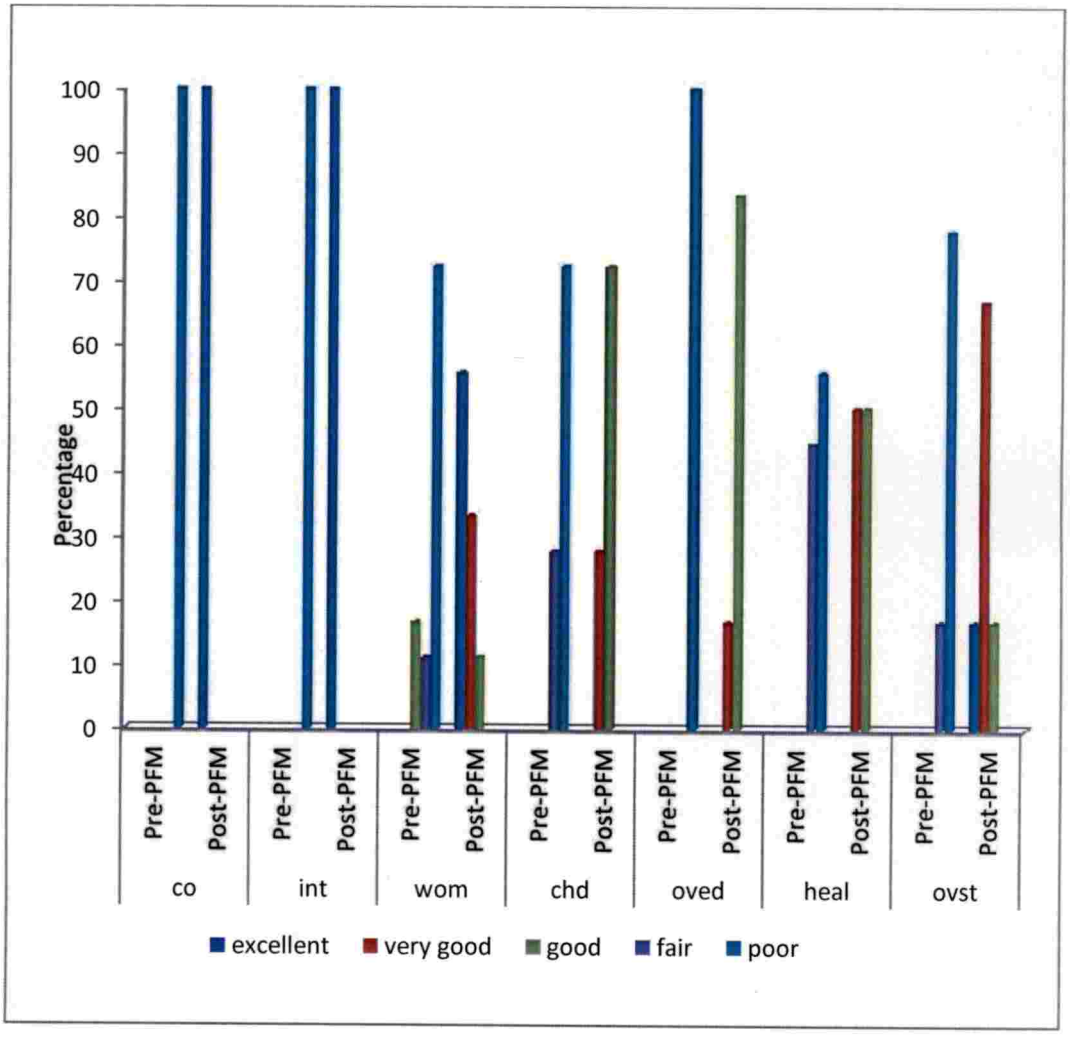

Fig 18. Responses to participatory indicators by Karikadavu VSS

From Fig 18, it is clear that in the pre-PFM period, majority of the people said that co-operation and interaction of local people with forest department officials was poor. There was lesser participation of women. The overall standard of living was poor. In the post-PFM period, all these aspects improved.

4.3.3. Kunchipara VSS

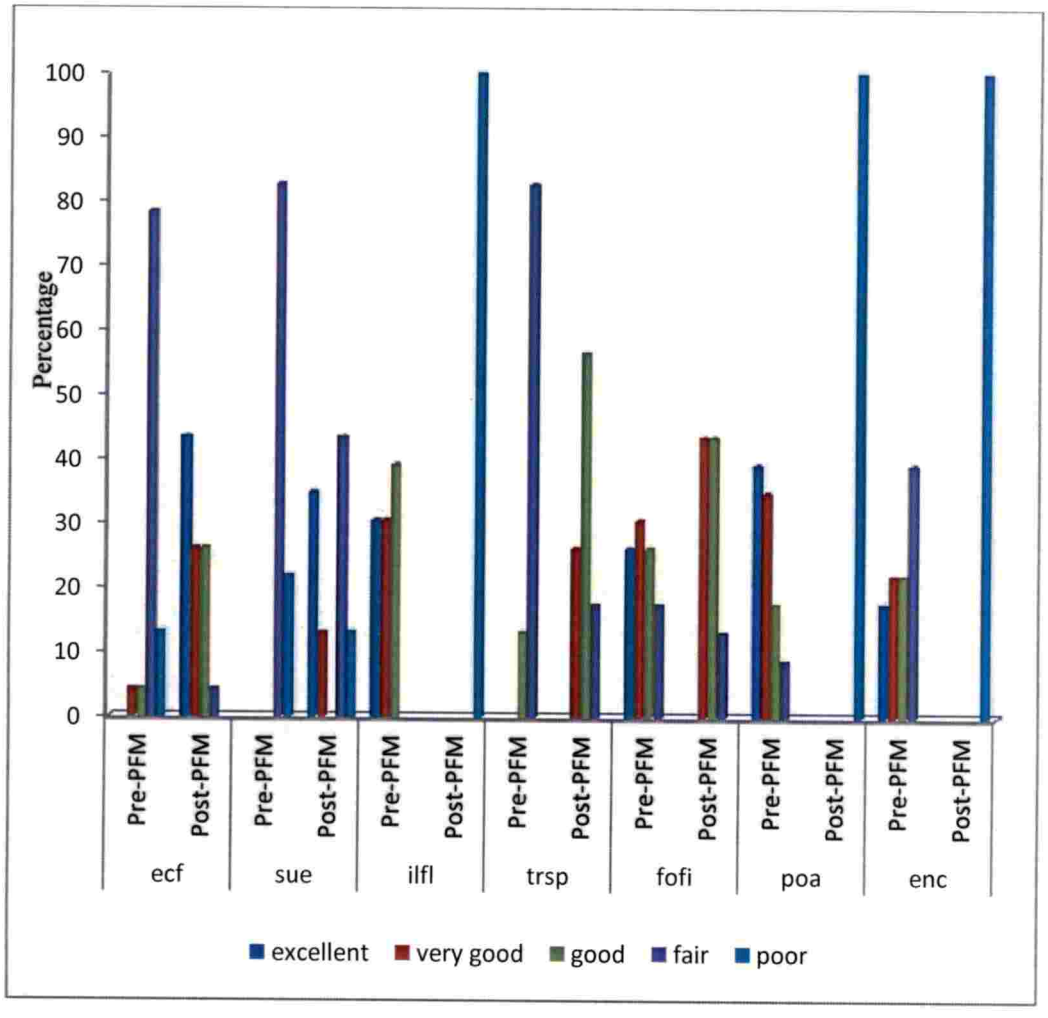

Fig 19. Responses to ecological indicators by Kunchipara VSS

From Fig 19, it can be seen that in pre-PFM period, majority of the people were of the view that ecological condition of forests and sustainable extraction of NTFPs and tree species diversity was fair, incidents of forest fires, illicit felling, poaching and encroachment was there while in post-PFM period, majority of the people were of the view that ecological conditions of forests improved. Incidents of poaching and encroachment were not reported.

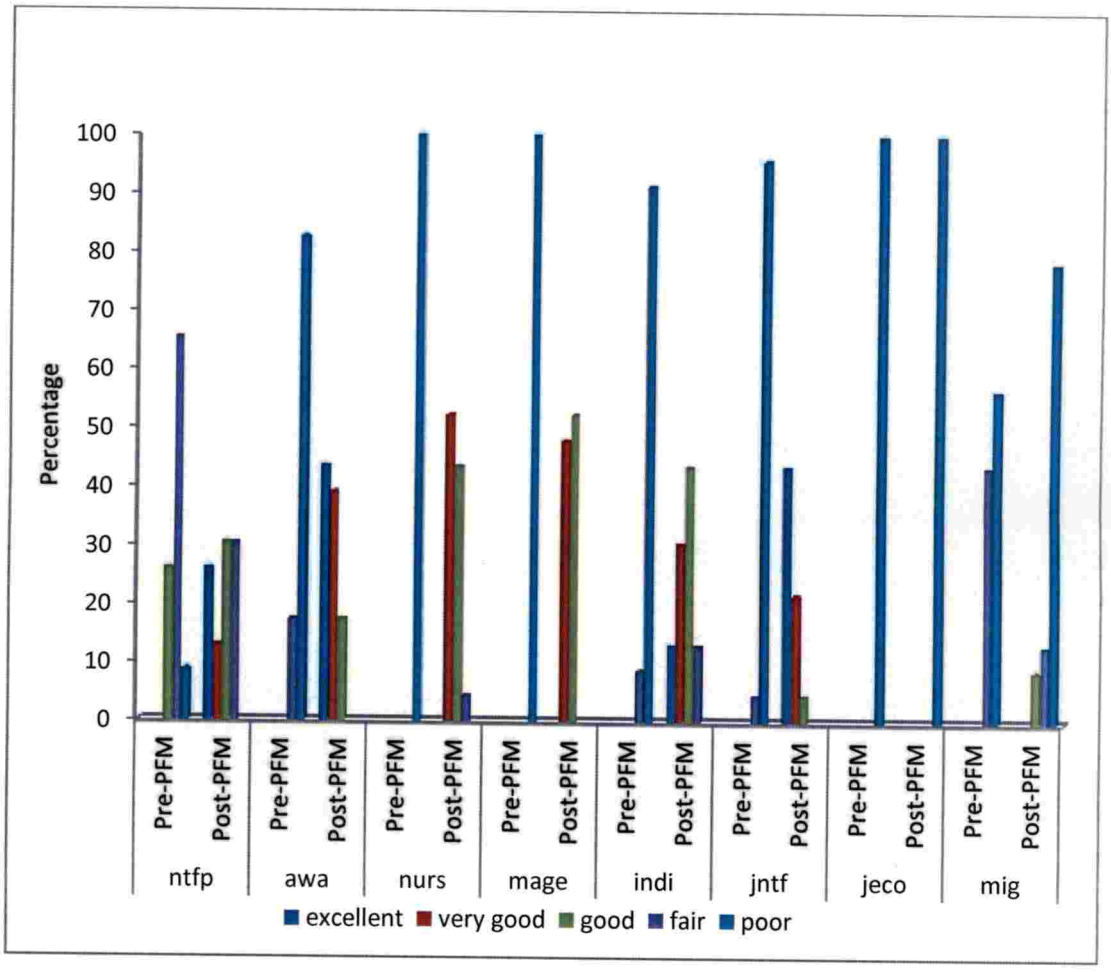

Fig 20. Responses to institutional indicators by Kunchipara VSS

From Fig 20, it is seen that in pre-PFM period, majority of the people responded that NTFP marketing was fair and awareness about protection and conservation of forests and knowledge about tree nursery technology was poor. During pre-PFM period, the managerial capacity and individual decision making power of people was poor. During post-PFM period, people gained knowledge about tree nursery technology and became aware of the need of protection and conservation of forests. The decision making power of the people had improved after PFM implementation. Job opportunities through NTFP collection has increased and hence the migration of people in search of jobs reduced.

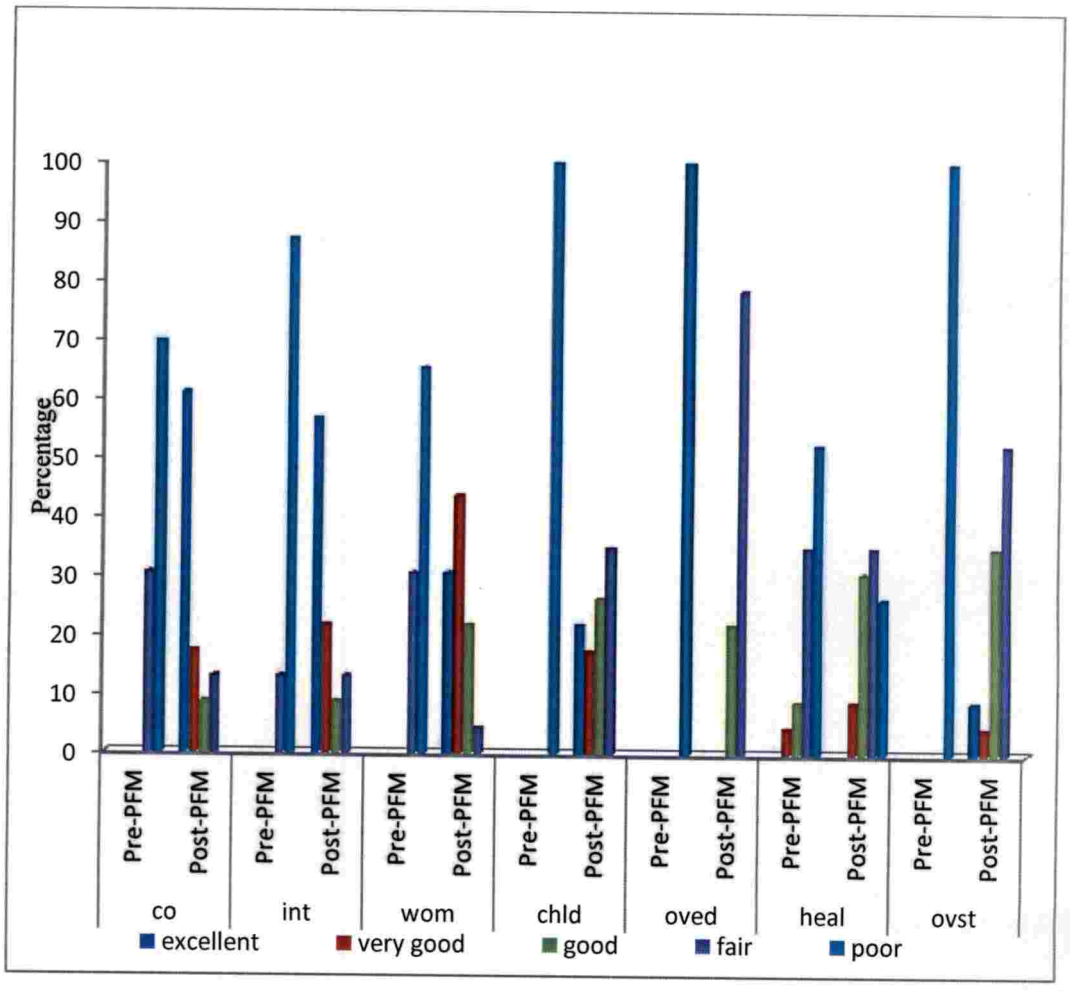

Fig 21 . Responses to participatory indicators by Kunchipara VSS

From Fig 21, it is clear that in pre-PFM period, majority of the people responded that, overall education status and standard of living was poor during pre-PFM period. There was lesser participation of women and people were not aware about the importance of maintaining health. During post-PFM period, the co-operation and interaction between local people and forest department has increased and women started participating in various activities in protection and management of forests. After implementation of PFM, people were made aware of the importance of health and education.

4.3.4. Poovanchira VSS

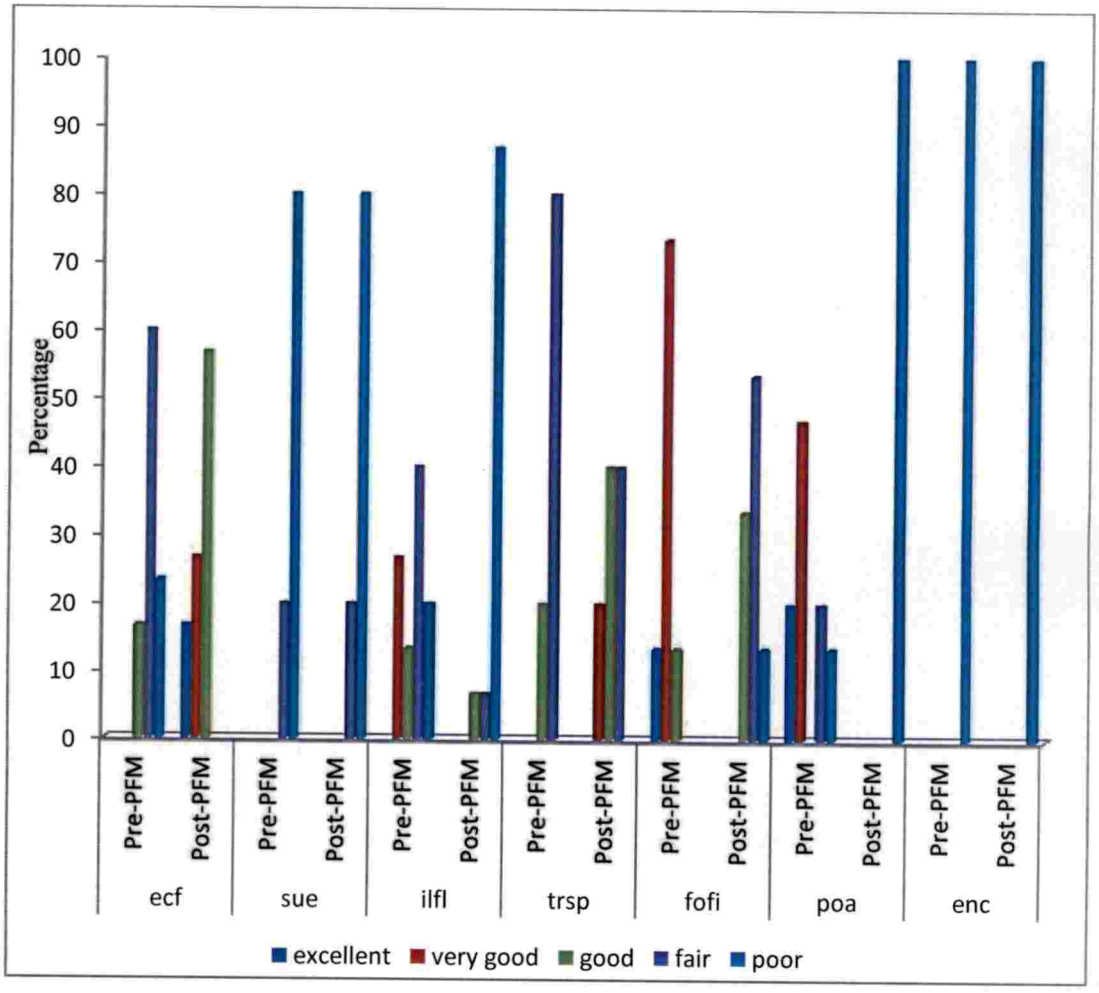

Fig 22 .Responses to ecological indicators by Poovanchira VSS

From Fig 22,it is seen that in pre-PFM period, majority of the people admitted that extraction of NTFP was not done in a sustainable manner. Cases of illicit felling and poaching were also reported. During post-PFM period, majority of the people admitted that ecological conditions of the forests were improved. The extraction of NTFP was not done in a sustainable manner even after the implementation of PFM. Incidents of poaching and encroachment were not there.

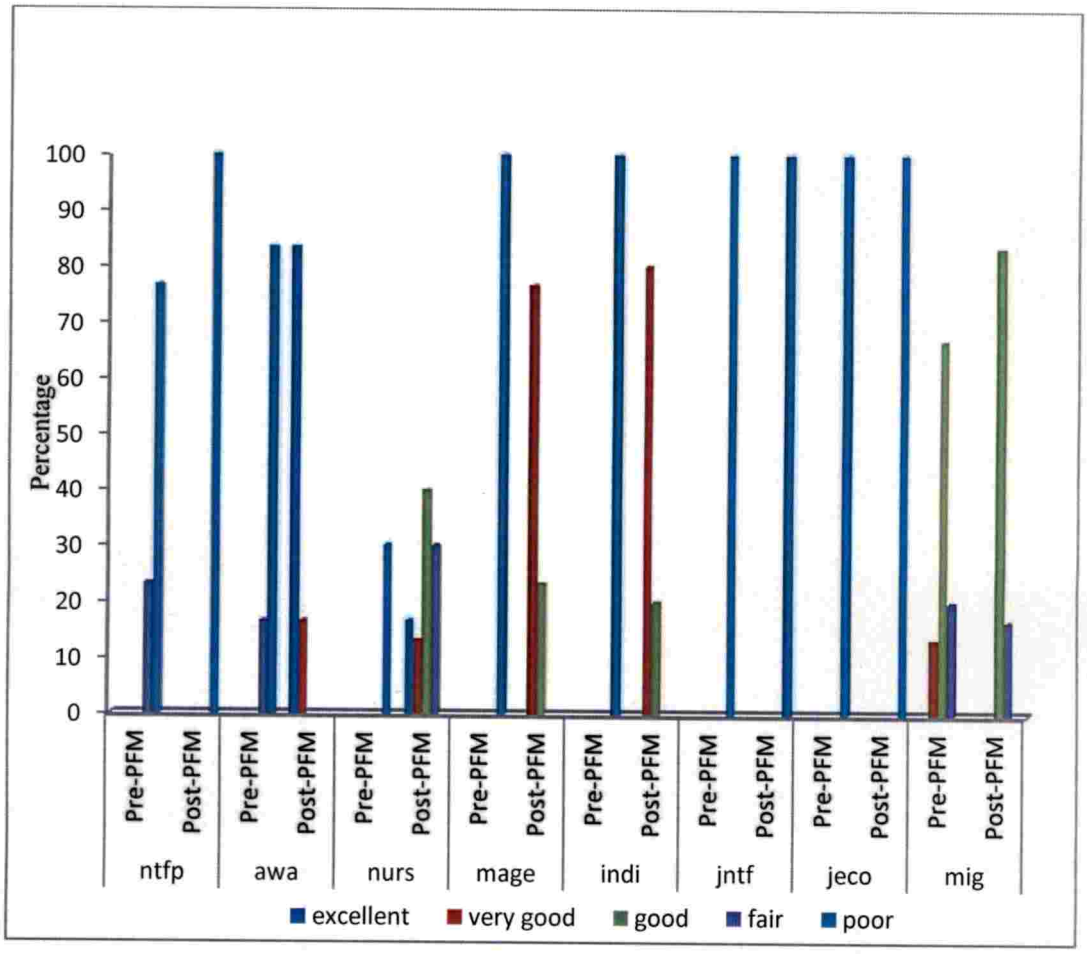

Fig 23. Responses to institutional indicators by Poovanchira VSS

From Fig 23, in pre-PFM period, majority of the people admitted that job opportunities through NTFP collection was not there. People were not aware of the importance of protection and conservation of forests and they had no idea about the tree nursery technology. After implementation of PFM, people gained knowledge about tree nursery technology and awareness about protection and conservation of forests. The decision making power and managerial capacity of the people increased by the participation of people in various activities.

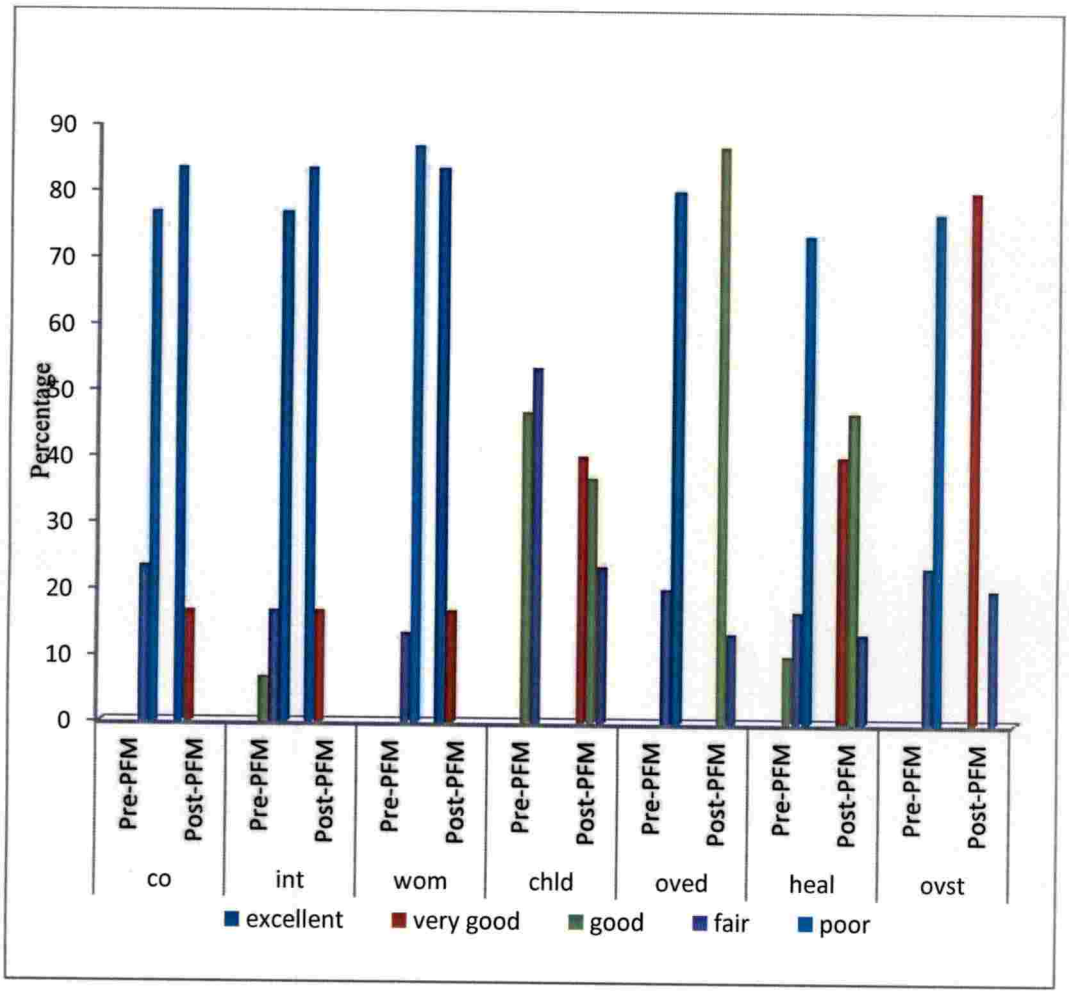

Fig 24. Responses to participatory indicators by Poovanchira VSS

From Fig 24, it is clear that majority of the people admitted that there was hardly any co-operation and interaction between local people and forest department officials. There was lesser participation of women. The overall education status and standard of living of the people was poor. During post-PFM period, the co-operation and interaction between local people and forest department officials were turned better. Participation of women has increased. People were made aware of the importance of health and protection of forests.

4.3.5. Vazhachal VSS

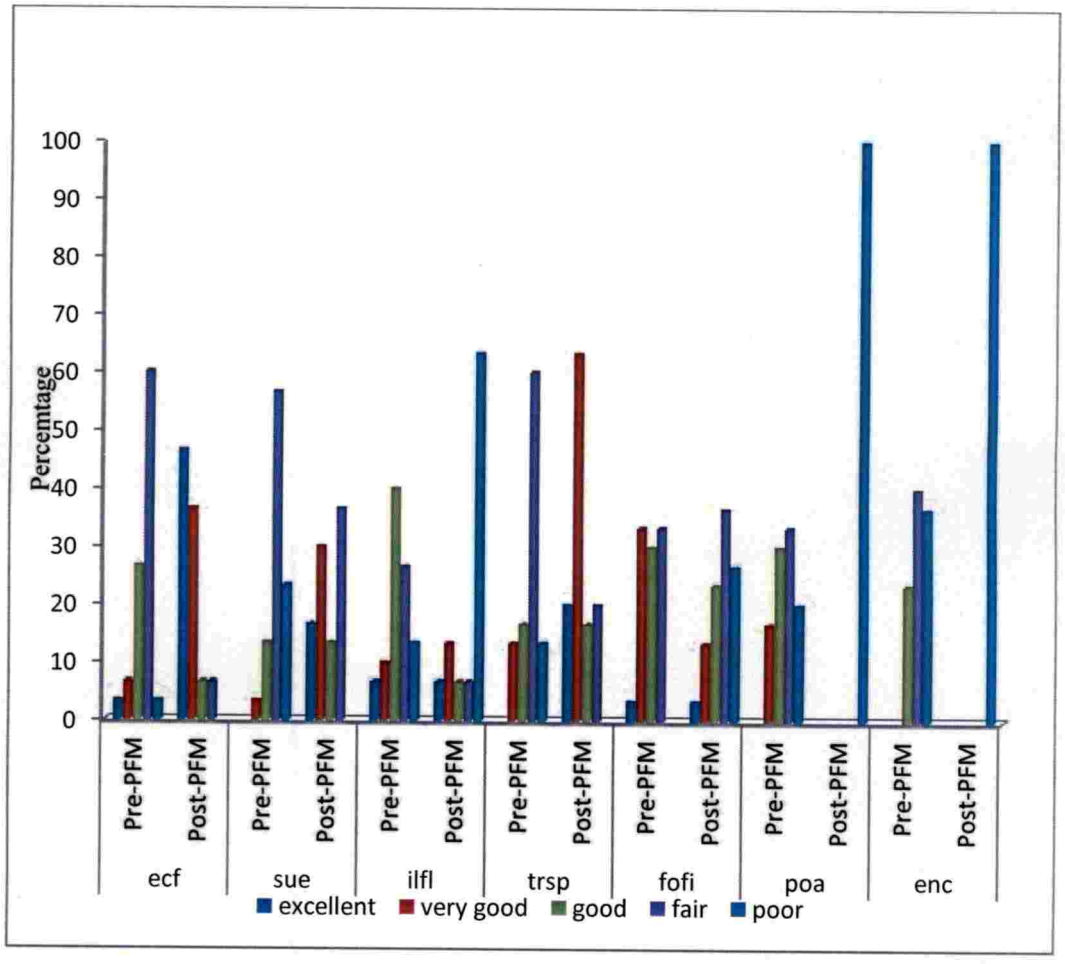

Fig 25 . Responses to ecological indicators by Vazhachal VSS

From Fig 25, in pre-PFM period, majority of the people responded that extraction of NTFPs was not done in a sustainable manner and incidents of forest fires, illicit felling were reported. During post-PFM period, the ecological conditions of the forests were improved and the extraction of NTFP was done in a sustainable manner. Incidents of forest fires were reduced. Cases of poaching and encroachment were not reported.

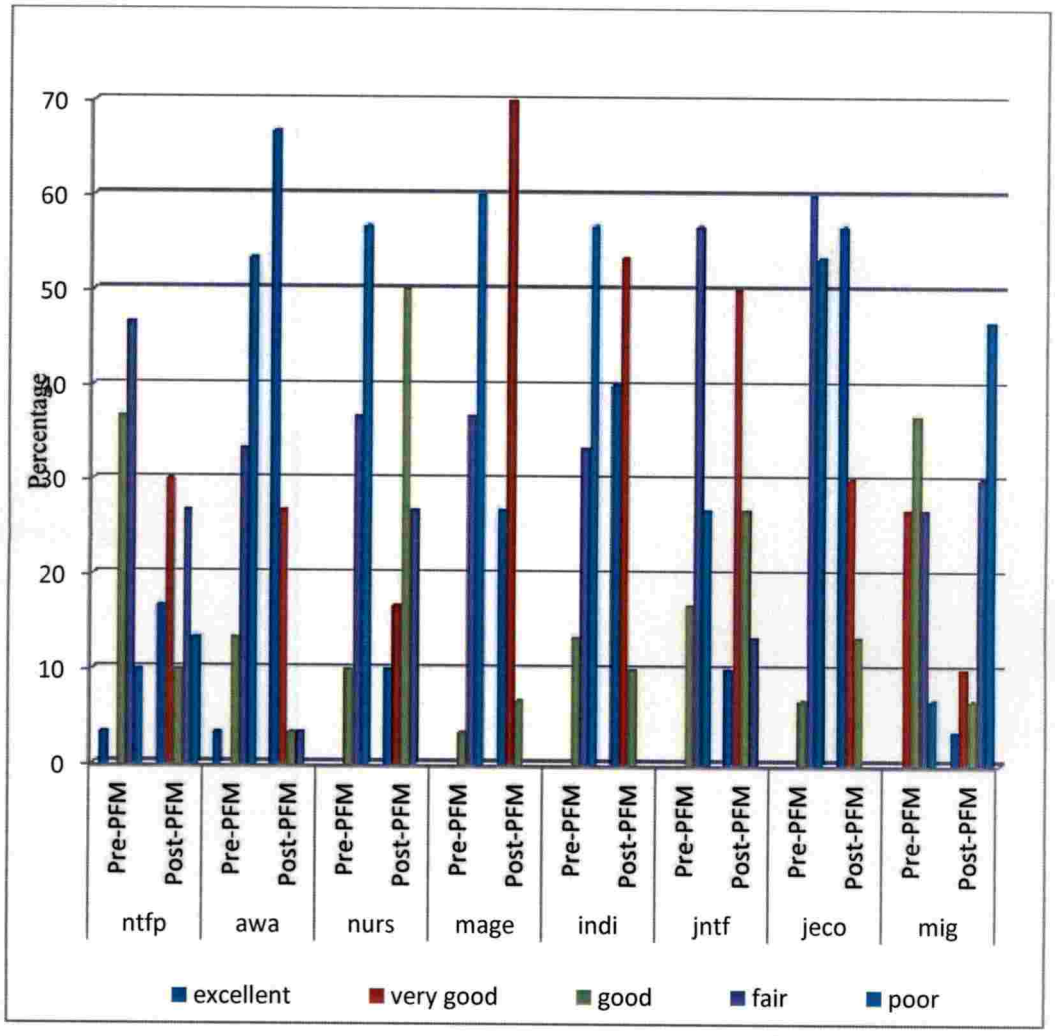

Fig 26. Responses to institutional indicators by Vazhachal VSS

From Fig 26, it is seen that, people were hardly know about tre nursery technology during pre-PFM period. People were not aware about the importance of protection and conservation of forests. During post-PFM period, job opportunities through ecotourism had increased and hence migration in search of jobs outside the village had reduced. The managerial capacity and decision making power of the people had increased because of their participation in various activities by PFM.

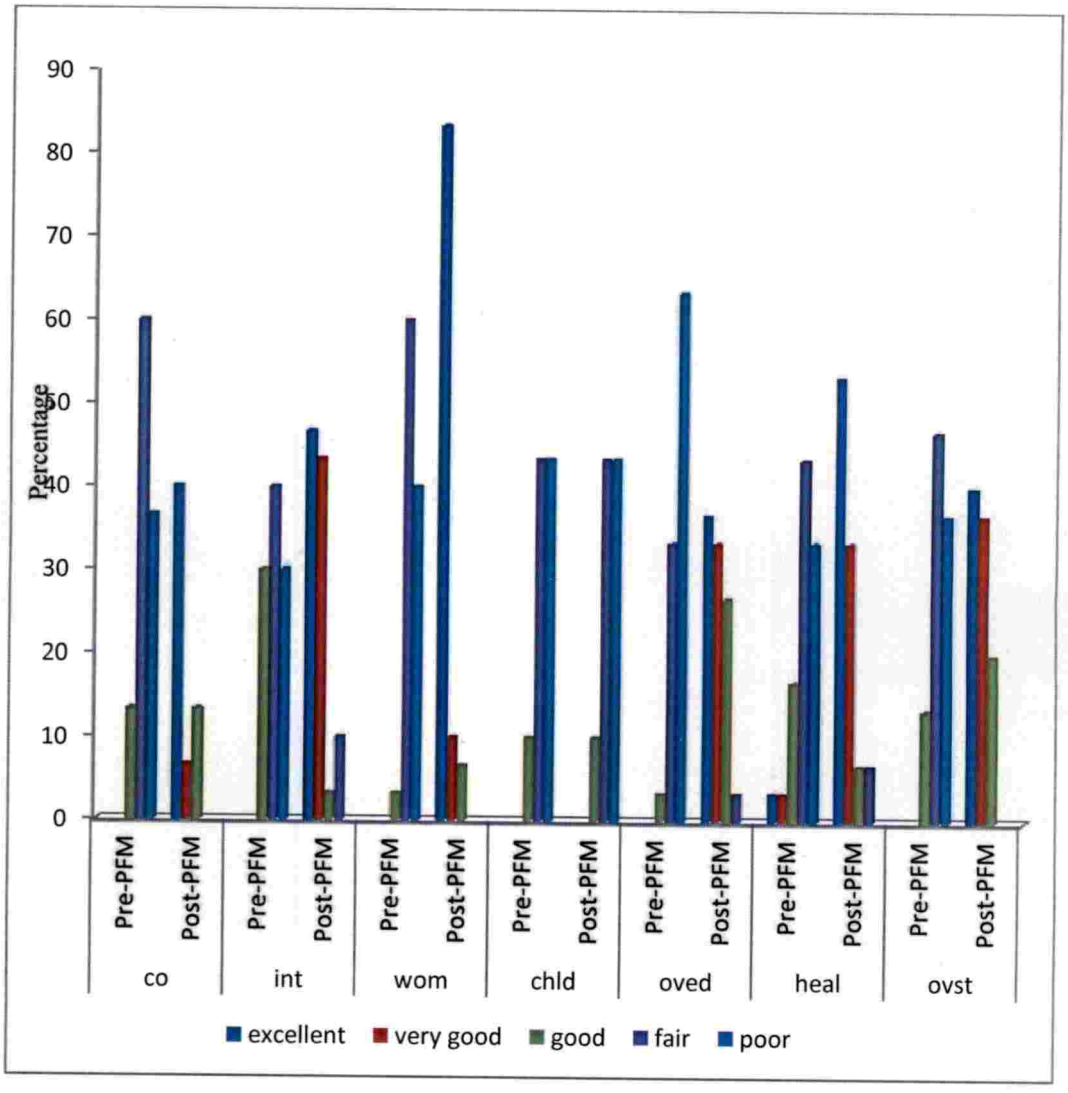

Fig 27.Responses to participatory indicators by Vazhachal VSS

From Fig 27, it is clear that majority of the people admitted that co-operation and interaction between local people and forest department officials was less. There was lesser participation of women. People were hardly know about the importance of education and health. During post-PFM period, participation of women in PFM activities has increased. People were made aware of the importance of health and education.

4.4. COMPARISON OF THE PERCEPTIONS OF PRE-PFM AND POST-PFM SITUATIONS WITHIN THE VSS

The results of the comparisons of the perceptions of pre-PFM and post-PFM situations is outlined below

Table 6. Within VSS, perception variations between pre – PFM and post-PFM situations

Sl no	VSS	t - stat	P value
1	Anapantham	27.14**	< 0.001
2	Karikadavu	18.72**	< 0.001
3	Kunchipara	18.71**	< 0.001
4	Poovanchira	33.76**	< 0.001
5	Vazhachal	26.30**	< 0.001

Note: ** indicates that there is significant difference between pre and post-PFM situations in each VSS

Analysis about the differences between pre-PFM and post-PFM situations (Table 3) in each VSS revealed that in the five Vana Samrakshana Samithies, perceptions of local people regarding the conditions before and after PFM were different. Among the five, the difference in perceptions was highest in Poovanchira VSS(t-stat = 33.76) and lowest in Kunchipara VSS(t-stat= 18.71) and Karikadavu VSS(t-stat= 18.72).

4.5 COMPARISON OF PRE-PFM AND POST-PFM SITUATION BETWEEN VSS

The results of comparison of pre-PFM and post-PFM situations between VSS is outlined below.

Table 7 . Comparison of pre- PFM situation between VSS

Sl no	VSS	Mann – Whitney U test	P value
1	Anapantham & Karikadavu	245^{ns}	0.593
2	Anapantham & Kunchipara	110.5**	<0.001
3	Anapantham & Poovanchira	256.5**	0.004
4	Kunchipara & Karikadavu	77**	0.001
5	Poovanchira & Karikadavu	177.5**	0.048
6	Poovanchira & Kunchipara	199**	0.009
7	Vazhachal & Anapantham	384.5^{ns}	0.332
8	Vazhachal & Karikadavu	207^{ns}	0.179
9	Vazhachal & Kunchipara	101.5**	<0.001
10	Vazhachal & Poovanchira	231**	0.001

Note: ** indicates that there is significant difference between pre-PFM situations
^{ns} indicates that there is no significant difference between pre-PFM situations

From the Table 7, it is evident that, the perceptions about pre-PFM activities were not significantly different in the three pairs of VSS namely Anapantham & Karikadavu, Vazhachal & Anapantham and Vazhachal & Karikadavu.

Table 8 .Comparison of post-PFM situations between VSS

Sl no	VSS	Mann – Whitney U test value	P value
1	Anapantham & Karikadavu	247^{ns}	0.623
2	Anapantham & Kunchipara	308.5^{ns}	0.512
3	Anapantham & Poovanchira	247^{**}	0.003
4	Kunchipara & Karikadavu	193^{ns}	0.712
5	Poovanchira & Karikadavu	146^{**}	0.008
6	Poovanchira & Kunchipara	239^{ns}	0.06
7	Vazhachal & Anapantham	203^{**}	<0.001
8	Vazhachal & Karikadavu	137.5^{**}	0.005
9	Vazhachal & Kunchipara	137.5^{**}	<0.001
10	Vazhachal & Poovanchira	57^{**}	<0.001

Note: ** indicates that there is significant difference between post-PFM situations

^{ns} indicates that there is no significant difference between post-PFM situations

From the Table 8, it is clear that the perceptions about the PFM activities were not significantly different in four pairs of VSS namely Anapantham & Karikadavu, Anapantham & Kunchipara, Kunchipara & Karikadavu and Poovanchira & Kunchipara. .

4.6. COMPARISON OF PERCEPTION SCORE BETWEEN PRE-PFM AND POST-PFM SITUATIONS WITHIN THE VSS

The results of comparison of perception score between pre-PFM and post-PFM situations within the VSS is outlined below.

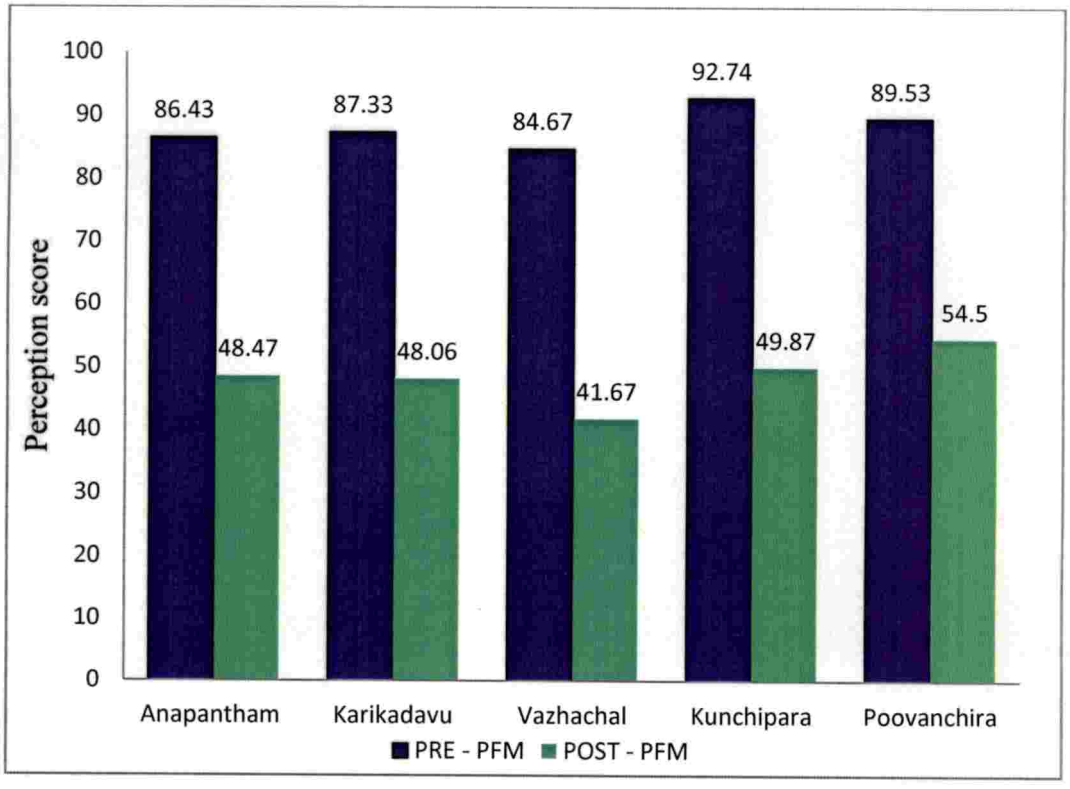

Fig 28. Pre-PFM and post-PFM perception score

From Fig 28, it is clear perceptions varied between pre-PFM and post-PFM situations in each VSS. Among the five VSS, the highest variation in perception score was in Vazhachal VSS(from 84.67 to 41.67) and the lowest variation in perception score was in Poovanchira VSS(from 89.53 to 54.5).

Discussion

5. DISCUSSION

The present study attempted to understand the impact of participatory forest management on the livelihoods of indigenous communities the Central Forest Circle of Kerala. For this purpose, five randomly selected tribal Vana Samrakshana Samithies (TVSS) formed the sample. An analysis of pre and post PFM situations as perceived by these communities was also done. The results of these studies are discussed below.

5.1 Impact Analysis

The Impact Pathway concept was employed to understand how PFM activities impacted the five livelihood assets namely financial capital, physical capital natural capital, human capital and social capital, which are the livelihoods assets available to participating communities. As the five capital assets are closely linked to each other, changes in one will affect the other as well. It is evident from the results of data analysis that PFM activities have made impacts on the livelihoods in all the five Vana Samrakshana Samithies. Most of the five capitals that were used to assess the livelihoods in each VSS registered a positive shift, although in some VSS, certain capitals did not register improvements as expected.

In Anapantham VSS under Chalakkudy Forest Division, the financial capital, physical capital and social capital registered positive changes while its natural and human capitals registered a decline (Fig 3). Financial capital comprises savings, remittances and other cash assets. PFM is expected to increase direct consumption and increase in earnings through sale of forests and also by sale of products from employment generating activities (Belcher 2005). Before PFM implementation, the average wage rate for a person at Anapantham was Rs.200 per day. After the PFM implementation, the forest department increased the wages to Rs.350 per day. A wage hike of Rs.150/- naturally improves their purchasing power. More money at one's disposal means that there is an opportunity to invest and improve one's living conditions. At Anapantham, people would get work for an average of 25 days per month. Moreover, the main

occupation of people in Anapantham VSS is NTFP collection and income from this collection was very high. So, increase in their wage rate plus additional income form NTFP collections were an important reason for increase in financial capital. Apart from this, various skill development programmes are arranged by the forest department which helped the VSS members to earn additional money. The local communities, especially women folk, were given training in various skills such as stitching, pickle making etc. Since, the people are getting the required money needed from these, their migration to other places in search of jobs got reduced which helped them to cut additional expenses involved in travelling to far away places in search of jobs and also subsequent spending on food from non-home sources etc. So concentration of jobs due to PFM implementation helped these people to earn a steady income and thereby raise their financial capital. Physical capital also registered greater changes in Anapantham VSS. Infrastructure facilities were lacking here before PFM implementation. The number of houses got increased from 60 to 70 after PFM implementation in 2002. Electricity and toilets were also lacking during pre-PFM era. But now, 65 houses in the VSS were provided with electricity and toilet and better facilities. Still five houses are yet to get these facilities. All the houses were provided with gas connection and water facilities. Financial capital and physical capital have inter-connection with each other (Pandey, 2005). As financial capital increased, the people got enough money to buy commodities which they previously were not able to purchase. Physical capital depends on various assets of a household's possessions (Das, 2012). They started to buy vehicles (motor bicycles, bicycles etc.) for easy transportation and save time. The transportation is easy now as there are better roads. Social capital also showed positive change at Anapantham. Social capital is essentially a social relationship in the form of capital that governs interactions among people and contributes to economic and social development (Das, 2012). Before PFM implementation, interaction was less between forest department and local people. The people were afraid to talk to the officials. Only the head of the village or men used to converse with forest officials. After, implementation of PFM, the level of cooperation between forest

department officials and local people has gathered momentum which also saw various development activities in the area. The frequent VSS meetings carried out in a year also facilitated their frequent interactions. In Anapantham VSS, the percentage of interaction among people and forest department officials became 100 per cent (Fig 3). These meetings were usually held in community hall of Anapantham VSS. Women started participating in PFM activities after its implementation. Nearly 60 per cent of women in the village now are actively involved in PFM activities, though a 40 per cent is still to get involved. Meanwhile, human capital has registered a decline in Anapantham (Fig 3). But education and healthcare are the key components for formulating human capital (Das, 2012). After PFM implementation in 2002, the population in the tribal colony has increased from 200 to 291. But through family planning initiatives, the percentage of children has come down from 28per cent to 14 Per cent. At the same time, the percentage of school going children has increased from nearly 10 per cent to 60-70 per cent (Fig 3). As the colony residents understood the value of education and schooling, the percentage of school dropouts got reduced. In Anapantham VSS, free PSC coaching, driving coaching, books, skill training classes, educational awareness classes has been provided by VSS in the tribal colony. All these are positive interventions on the human capital at Anapantham. But the natural capital of Anapantham has marginally decreased. It was observed that the canopy percentage cover in the tribal settlement area has decreased post PFM implementation perhaps due to a declining forest health and new settlements in the tribal colony. For the construction works of settlements, forest land was cleared. The natural capital of the forest-dependent households is basically their access to common pool forest resources that flow forest products, as well as other direct benefits (Das, 2012). Trees have been cut off for the construction and for getting more sunlight as it was essential. Though the people in the village depended upon collection of NTFP for their livelihood, sustainable extraction of NTFP was not a concern for them. People here are also not concerned about the availability of forest products in future. Taking these on account, it can be concluded that this was the main reason for the decrease in natural capital in their

area. Increase in financial capital has led to increase in physical capital. People started to build new houses and other constructions, buy new vehicles etc.

In Karikadavu VSS under Chalakkudy Forest Division, social capital, financial capital and physical capital has shown positive changes and natural capital and human capital has shown negative changes (Fig 4). The wage rate has increased from Rs.200 before PFM implementation to Rs.350 after PFM implementation. But the number of days of work availability has decreased from 20 before PFM implementation to 15 after PFM implementation. Before PFM era, the people had to go in search of job and money by themselves. So if they want to meet their needs, they have to work till they get enough money. Also, the money they got was less. But, now, the condition has reversed after PFM implementation. Now, forest department is giving them job through VSS. They are getting the required wages also. The conditions of their living can be made even better if the work days are increased. Since forest department is providing job, the people don't have to search jobs from other sources. The main occupation in Karikadavu VSS includes NTFP collection. Since work days are less, the income from NTFP collection was moderate. Out of a population of 79, seventy six had bank accounts. So they started to save the money they received from various PFM activities. The main PFM activities carried out were planting, fire line, NTFP collection etc. Special training was given for doing fire line works by VSS. Other skill training such as tailoring, cover making etc. which helps in making additional income were also provided. The number of houses present now is 14. Every house was provided with electricity and toilet facilities which were lacking in pre-PFM period. Three households were having vehicles such as bikes which help in easy transportation. Another eleven households were aspiring to buy vehicles. This was possible as financial capital has registered a slight increase after PFM implementation (Fig 4). This means that the people are getting money for meeting their basic needs, but only few have the capacity to buy vehicles. This can be due to lack of saving by them. Though usually a function of a saving-credit scenario, financial capital, in forest situations, is appraised in terms of cash

income (Reddy et al. 2004) as the credit market in rural areas, especially in forest fringe sites, is either absent or very thin, and people are understandably reluctant to talk about savings (Sarker and Das 2008). It was according to the nature and attitude of people. If a house hold has more members, the money they are getting from the forestry works were only enough for satisfying their needs. Those people can't even think of saving and enjoying new facilities. If the numbers of work days are increased, these problems can be solved. Human capital has decreased in Karikadavu VSS after implementation of PFM. In Karikadavu VSS, the percentage of women has increased from 33 per cent before PFM implementation to 36 per cent after PFM implementation. The population in the village has increased from 70 before PFM implementation to 79 after PFM implementation. The percentage of school going children has increased from 50 per cent (before PFM implementation) to 100 per cent (after PFM implementation). Educational awareness programmes and PSC coaching were provided by VSS. So school dropouts were not there. Meanwhile the natural capital has shown a slight decrease. The canopy percentage has decreased from 60 per cent before PFM implementation to 50 per cent after PFM implementation. This can be due to migration of people in search of jobs, increased consumption of firewood etc. From figure 4, it was clear that financial capital had only a slight increase. Also, it was earlier stated that people are not getting enough money to save and enjoy new facilities. Because of this, people started to migrate to other places in search of jobs. Increase in population, environmental degradation etc are also factors influencing migration. As sustainable extraction of NTFPs are not taking place in the tribal village, there were lack of availability in resources. So the people would migrate in search of firewood, other resources etc. (Gray, 2010). As land was cleared for constructions, land degradation also occurred. Social capital has improved after PFM implementation (Fig 4). VSS meetings are held in the colony to ensure the participation of the people and interaction with forest officials. The frequency of interaction between local people and forest officials are now very high. It has increased from 60 per cent (before PFM implementation) to 100 per cent (after PFM implementation) (Fig 4). This means the people are very active in

PFM activities. The percentage of women participation has increased from 60 per cent (before PFM implementation) to 100 per cent (after PFM implementation) (Figure 4). Women are actively involved than men in PFM activities, where men are given other jobs such as forest watchers which makes then unavailable in day time. So in every VSS meetings conducted the attendance of women will be more which were lacking in pre-PFM era.

In Kunchipara VSS, social capital, physical capital and financial capital has improved while human capital has remained the same (Fig 5). Natural capital has shown a slight reduction (Fig 5). Here the wage rate has increased from Rs.100 before PFM implementation to Rs. 400 after PFM implementation. The numbers of work days also increased from ten before PFM implementation to thirteen after PFM implementation. The main occupation in Kunchipara VSS was NTFP collection. NTFPs play a crucial role in the daily life and welfare of the tribal people (Alex, 2014). Income from NTFP collection are more. Not all days they are getting works. So a moderate increase is observed in financial capital. This can be improved by increasing the work days. Physical capital has also shown a better change after PFM implementation (Fig 5). This can be reported as a moderate change. Physical capital is capital created by people themselves and includes houses, vehicles, agricultural machinery, communication facilities, transport infrastructure etc. (Pandey, 2005).Till now, electricity has not reached the colony. People are surviving there by using solar power. But, if it is a rainy day without getting proper sunlight, they have to go without power. Majority of the houses are having gas connections and toilet facilities. Prior to PFM implementation, construction of a road was an important concern as the residents had difficulty in travelling to that area. People have to walk through the forest areas to reach their home. But now, a road, though not properly constructed is there. As the area lacks a primary health centre, people have to reach nearby town to reach the hospital. It will be difficult in emergency situations. A small ayurvedic dispensary has started now at Kunchipara. But in emergency situations, that was not enough. The numbers of houses having vehicles are also less

probably because of the lousy transportation facility. The only means of transport available now was a jeep. Jeeps are not available all the time inside the village. In case of emergency, jeep would reach at the required place. Human capital has not shown any change. So the average birth and death rate would be equal. The percentage of women is more than men in that village. The situation was same before and after implementation of PFM. Before PFM implementation, the percentage of women was 53 per cent and after PFM implementation, it was 51 per cent. Out of the total population of 392, 201 are female and the remaining were males after PFM implementation. At present, most of the students are going to school. But the tendency to stop schooling could also be seen among them. It can be because of the poor transportation facilities, social stigma etc. Social stigmas are stereotypes attributed to a person when their behaviour was viewed different by other people (Ahmedani, 2011). Here, natural capital has shown a slight decrease. The canopy percentage has decreased from 80 per cent before PFM implementation to 70 per cent after PFM implementation. Since the colony was not subjected to much disturbances or developments, there would be a slight variation only. Social capital has shown a tremendous positive change after PFM implementation. This means that the frequency of social interaction has increased which were lacking in the pre-PFM era. During, pre-PFM era, people were afraid to come to the fore-front of the society and generally they are shy in nature. Because of the meetings, seminars, awareness classes etc. conducted by VSS, the frequency of the interactions among them and department officials has increased. This lead them to take initiatives in forest protection and management programmes conducted by VSS. VSS meetings are regularly conducted in the village. The frequency of interaction among local people and forest officials has been increased from 40 per cent before PFM implementation to 100 per cent after PFM implementation. People are more co-operative than the previous situations. The participation of women has also increased from 40 per cent before PFM implementation to 100 per cent after PFM implementation. JFM aids in social capital formation and making the social networks stronger (Pandey, 2005). Women population was higher in both pre-PFM and post-PFM period. So it was

essential to ensure the complete participation of women. Women were primarily involved in household chores and thus they know the value of consumption of resources. Since the main occupation in Kunchipara was NTFP collection, the sustainable extraction of NTFPs was an important concern. So, by knowing the real value of resources and its sustainability for future use, women are appropriate for collection of resources. Also, now men were given different other jobs such as forest watchers. Hence women will be mostly available than men. Since the distance from their place to the outside area was more, there are not in contact with the outside world. Now, the situations are improving. Interactions are now more compared to pre-PFM conditions

In Poovanchira VSS, it was observed that post PFM, the physical capital, financial capital, human capital and social capital of the VSS has increased while its natural capital has reduced (Fig 6). Here too, there was a hike in the wage rates which has increased from Rs.200/- (before PFM implementation) to Rs.400/- (after PFM implementation). But the number of days of work has decreased from 20 (before PFM implementation) to 15 (after PFM implementation) (Figure 6). The financial capital of this VSS would have been much better if there was an increase in the number of work days. But even without much work days also, the VSS could build up a good financial capital. This was because of the wage hike of Rs.200/- after implementation of PFM. The main PFM activities were planting, fire line management etc. Here as NTFP collection is not an activity, the chances of getting income from this activity are not possible. Physical capital of Poovanchira VSS has greatly improved in the post PFM scenario (Fig 6). Out of the 52 houses, every house were provided with electricity, gas connections and toilet facilities after implementation of PFM. Proper road and transportation facilities were there in the village. Before PFM implementation only few houses were having these facilities. Human capital has also improved (Fig 6). The increase in human capital led to the increase in financial capital and finally, led to the increase in physical capital. Out of the total population of 196 people, 103 were female and rest are male. Through family planning, the number of children

has been reduced. Simultaneously the percentage of school going children has also increased since the access to transportation was easy. The social capital of Poovanchira VSS also recorded a large change after PFM implementation. This was due to an increase in their social interactions. VSS meetings are now regularly conducted. Before PFM implementation, the participation of women was less. They refused to come to the forefront of the society. Now, the situation has changed. In every programme, women participation is more. A 75 per cent increase in participation of women is now evident after PFM implementation (Fig 6). The interaction between the forest officials and local people has also increased to 90 per cent after PFM implementation (Fig 6). The people acknowledged that the interaction level was very poor before PFM period.

In Vazhachal VSS, while the financial capital, physical capital and social capital showed an increase, the natural capital and human capital registered a decline (Fig 7). Here too, the wages has increased from Rs.200 (before PFM implementation) to Rs. 450. But the work days declined from 10 to 7. At present, a person is getting work for an average of 7 days. This is because they are working in shifts. So that everyone in the VSS was getting employment. Most of the people were having bank accounts. Ecotourism was more prominent in Vazhachal VSS while NTFP collection is less. So income from ecotourism was more. This was the reason for increase in financial capital in Vazhachal VSS. Physical capital has also improved tremendously after PFM implementation (Fig 7). Increase in financial capital has led to the increase in physical capital. Out of 69 houses, 62 houses were provided with electricity, 57 houses with gas connections and all the 69 houses with toilet facilities. Since the tribal village is in a tourist spot, proper road and infrastructure facilities are there. Other jobs which help the VSS members to earn additional income include job opportunities as forest watchers, as guide for tourists, to set up shops near tourist spots, fire line management etc. Ecotourism is providing better employment opportunities and income for the tribal people as these activities are executed through VSS. Since they had easy access to basic infrastructure facilities, transportation to schools,

hospitals etc. are also easy. Here all (100 per cent) the children are school going. Education and health awareness classes, seminars are conducted by the VSS which helped them to know the value of education and awareness of health. But here, the natural capital has recorded a decrease (Fig 7). The canopy percentage has decreased to 70 per cent after PFM implementation from 90 per cent (Fig 7). This can be due to land getting cleared for settlements, construction of new infrastructure, tourism interventions, increase in ecotourism spots etc. Environmental degradation was a cause for decrease in natural capital (Gray, 2010). Social capital meanwhile showed an increase after PFM implementation (Fig 7). The regularly held VSS meeting has increased social interaction. The percentage of women participation has increased after PFM implementation. Before PFM, women participation was scarce. The interaction between forest officials and local people were also poor before PFM implementation. Now, the interaction level was high and they are co-operating with authorities in various PFM programmes.

In all the five VSS, the natural capital has reduced in the post-PFM situation. Natural capital is different from other capitals. According to Neumayer(1998), human made capitals are easy to reconstruct. But natural capital is irreversible. Once it is destructed, it is very difficult to regain. One example can be derived from this study. In all the five VSS, the canopy percentage decreased for a minimum of 10 per cent. Since, the occupation of most of the people in the villages are NTFP collection and ecotourism, it may be hard to retrieve it. Due to ecotourism, land degradation will occur. Since, tourists are visiting place, land will get disturbed. For improving the facilities in a tourist spot, there will be shops, restaurants etc. If the number of tourist spots increases, it will affect the natural capital. Sustainable extraction of NTFPs were not carried out in any of the five VSS. This will lead to resource depletion in future. Also, the environmental impacts such as ozone layer depletion and global warming are increasing day by day. If the people ignore these, then again the natural capital will decrease in the nearby future. Actually, this was because of the ignorance of people. If people

were made aware of the consequences, then it can slowly overcome. But it takes time. These problems can be solved to an extent by planting more number of trees in the concerned VSS. Restrictions on waste disposal in the water bodies and land which in turn pollutes the water bodies and land should be promoted. Since NTFP collection was the main occupation of people in most of the VSS, executing the method of sustainable extraction helps to solve the problem to an extent. Human capital also registered decline in all the five VSS. On the other hand, social capital has increased in all the five VSS. According to Nguyen (2009), as the work days of the people increases, human capital also increases. So increase in number of work days in the VSS will increase the human capital in the VSS. As the work days increases, financial capital increases. People will get enough income to satisfy needs. Thus, they will get proper health and medical facilities. Children and pregnant ladies will get proper care. Hence, deaths due to health reasons will get reduced and human capital increases. From the impact study in all the five VSS, it is clear that in some VSS, the work days has registered a decline after PFM implementation. For example, in Karikadavu VSS, the work days before PFM implementation was 20 and now after PFM implementation it was reduced to 15. But the wage rate has increased to Rs.350 from Rs.200 before PFM implementation. If the work days too has increased to the same number of days before PFM implementation, the conditions could have been better can be better. Thus human capital can be improved. Collier (1998) opined that social capital increases with the increase in social interaction. With the increase in social interactions, the transmission of knowledge takes place, change in behaviour of the people and their attitudes etc. can be acquired. Thus most of the problems can be solved. In all the five VSS in the study, there was high social interaction in post-PFM situation than pre-PFM situation. Thus people started to take initiatives in forest management and protection activities. The standard of living and educational status of the people also improved because of the awareness generated by the VSS. From the capital wise analysis of all the five VSS, it is observed that the financial capital, social capital and physical capital has improved from pre-PFM to post-PFM situations while natural capital has reduced (Figure 8 to 12).

The reason can be the above stated. Human capital in Anapantham, Karikadavu and Vazhachal VSS has decreased. Human capital has shown increase in Poovanchira VSS only. After PFM implementation, the VSS were provided with basic infrastructures facilities which were lacking before PFM period. The level of social interaction has also increased which was also lacking.

5.2 Perception Analysis

Perception analysis is an important tool to know the past and current positions. Perceptions of people regarding the situations before and after implementation of PFM were different in all the five VSS. The difference is more in perceptions such as 'Ecological condition of the forest', 'Illicit felling', 'Co-operation between forest department and local people', 'Interaction between forest department and local people', 'Awareness about the importance of conservation and protection of forest' , 'Tree species diversity', 'Incidents of forest fire', 'Knowledge about tree nursery technology', 'Managerial capacity' , 'Individual decision making power', 'Participation of women', 'Job opportunities through NTFP collection' , 'Job opportunities through ecotourism', 'Child education', 'Overall education status' ,'Health awareness', 'Overall standard of living' , 'Poaching', 'Encroachment'. The ecological conditions of forest in all the five VSS has increased greatly. After PFM implementation, because of different seminars and activities conducted by VSS, the attitude of people towards the protection and conservation of forest has changed. Through VSS, activities such as planting, taking pits etc. were given as works to the people. Different awareness seminars about the need of protection and conservation of forests were also conducted. From the interaction with people in each of the VSS, it is clear that people realized the importance of forests and the need of its protection. With this realisation, their involvement in illegal activities such as illicit felling, poaching etc. has reduced. The department officials of the concerned VSS also opined that no such activities has taken place after these indigenous communities started realising the need of protecting the forests. People in all the VSS stated that many illegal activities such as illicit felling, hunting of animals, land

encroachments have taken place before the implementation of PFM. They also opined that people were not aware of the importance of protection of forests and wildlife in the pre-PFM era. Forests fires incidences were also high during pre-PFM period because they were not keen to get involved in preventive and remedial measures. Also, they were not properly aware about the measures to be taken to reduce the spreading of fire which caused destruction not only to the forests and wildlife, but also created livelihood challenges for themselves. A great reduction in forest fires has happened because of the activities of VSS which includes fire line management, which they do properly after PFM implementation. Through VSS, classes regarding the fire line management were conducted in all the VSS for the people. In all the five VSS, according to the responses given by the local people, tree species diversity has increased and knowledge of the people about tree nursery technology has improved. Before PFM implementation, tribal people had very limited awareness about tree nursery technologies including transplanting. PFM implementation created opportunities for awareness classes on tree crop nursery technology. After implementation of PFM, by knowing the value and importance of protection of forests, people, in co-operation with department started to plant more trees and thus increased the tree species diversity. This activity will help to rebuild the natural capital in future. By taking part in various activities conducted by VSS, people improved their managerial capacity and decision making power. This was due to their continuous participation. The participation of women has also increased. During the pre-PFM era, women hardly came to the fore-front of the society. Most of them were primarily involved in household chores and lacked social interaction with the people outside. But, after PFM implementation the condition has reversed by increasing their participation as a result of the various activities conducted by VSS. This helped to increase their livelihood income and reduce poverty (Bhatia and Yousef, 2013). People were afraid to talk with the forest department officials before the implementation of PFM. Without proper interaction, the department officials were unable to recognize the problems and needs of the people. After implementation of PFM, people started to co-operate and interact with forest

department personnel as a result of joint involvement in activities conducted by VSS.

Comparison of perception score between pre-PFM and post-PFM situations revealed that (Fig 13) the perception score of pre-PFM and post-PFM in each VSS are different. Perception is highly individualistic. The perceptions of people who are getting the same resources will be different (Niemoller and Washington, 2017). Many improvements such as road construction, electricity, toilets, gas connections, increase in wage rate, health facilities etc have been achieved after PFM implementation in all the five VSS. The result of these interventions has made improvements in the various capitals, as already mentioned in the impact analysis. This in turn has improved the living conditions of the tribal people in the VSS. Unlike the usual convention of mere focus on income and consumption, the sustainable livelihoods approach, which this study employed, directly addresses the critical role that assets play in improving households' social and economic wellbeing (Das, 2012).

The comparisons of pre-PFM and post-PFM situations between the VSS revealed that majority of the VSS possess significant differences between each other (Table 4 & 5). This can be due to many reasons. The conditions in the VSS may be similar to each other before and after implementation of PFM. Before PFM implementation, in all the five VSS, facilities such as road, electricity, toilet, gas connections were lacking. Settlements were also less. The tribal people were also alleged to be involved in many illegal activities such as illicit felling, poaching, encroachment etc. Incidents of forest fires were high. So, with regards to the five capitals, the conditions were similar across the five VSS. With the implementation of PFM, situations improved which in turn lured the tribal people away from getting involved in illegal activities. PFM also created opportunities for the tribal people to interact and cooperate in forest management activities. This can be major reason for the similar perceptions by the people in all the VSS. Perceptions of the people in Anapantham and Karikadavu were similar in pre-PFM and post-PFM situations. Anapantham and Karikadavu tribal colonies are

situated nearby to each other. So the PFM activities undertaken are done together. Since the places are nearer, the ecological conditions are also be same. Hence, their perceptions were same.

The impact angle of intervention by PFM in the five VSS under the Central Forest Circle is very much evident from the results of both the impact and perception analysis. The PFM interventions have altered livelihood security by means of desirable changes of the capitals in all the five VSS which is only likely to increase in future. While VSS like Kunchipara and Poovanchira were able to augment almost all of their livelihood capitals over the study period, in certain VSS like Anapantham, Karikadavu and Vazhachal, actions to improve capitals like natural and human are suggested. Our analysis of livelihood determination therefore hints that the Participatory Forest Management (PFM) programme envisaged to protect natural forests from further degradation and to strengthen livelihood capabilities was able to sustain and improve the tribal livelihoods under the Thrissur Forest Circle.

Conclusion

6. CONCLUSION

The objectives of the study were to understand the impact of participatory forest management on livelihoods of indigenous communities. Additionally, a perception analysis to know the pre-PFM and post-PFM situations as perceived by the community was also conducted. The study covered five tribal VSS in the Vazhachal, Chalakkudy, Malayatoor and Thrissur forest divisions under Central Forest Circle, Kerala. Sustainable livelihoods analysis was the method used for the impact study. Primary data was collected through a designed interview schedule. Secondary data was collected from forest department records, village records and discussion with people. The study found that PFM had a positive impact on the livelihood of the local communities in the selected five Vana Samrakshana Samithies namely Anapantham VSS, Karikadavu VSS, Kunchipara VSS, Poovanchira VSS and Vazhachal VSS. But there were variations among the five capital assets. In all the five VSS, physical capital, financial capital and social capital has increased while natural capital showed a decline. Natural capital can be improved by planting more number of trees. Human capital varied in all the five VSS. Kunchipara VSS recorded the highest increase in financial capital. In Anapantham VSS, Karikadavu VSS, Poovanchira VSS and Vazhachal VSS, there was a marginal increase in financial capital. In all other VSS except Kunchipara VSS, the number of work days had decreased in post-PFM situations than pre-PFM situation. This can be the reason for the marginal increase in financial capital. Physical capital increased in all the five VSS. The highest change was observed in Anapantham VSS. Vazhachal VSS has also registered a greater change. Human capital registered a marginal decline in Anapantham VSS, Karikadavu VSS and Vazhachal VSS whereas, it has remained same in Kunchipara VSS. Human capital increased in Poovanchira VSS. In all the five VSS, natural capital declined. Among the five VSS, the similar rate of changes were observed in Anapantham, Vazhachal and Poovanchira. In all the five VSS, social capital has increased in pre-PFM situations than post-PFM situations. The highest variation was found in Kunchipara VSS and lowest variation was found in

Karikadavu VSS. Perceptions of people regarding the situations before and after implementation of PFM were different in all the five VSS. After the implementation of PFM, changes in pre-PFM situations has occurred especially in situations such as ecological condition of forests, illicit felling, awareness about protection and conservation of forests, poaching, encroachment etc.

It is clear that perceptions varied between pre -PFM and post- PFM situations in each VSS. Among the five VSS, the highest variation in perception score was in Vazhachal VSS (84.67 to 41.67) and lowest in Poovanchira VSS (89.53 to 54.5). The analysis of perceptions about pre-PFM situations between VSS showed that the three pairs of VSS namely Anapantham &Karikadavu, Vazhachal &Anapantham and Vazhachal &Karikadavu had no significant difference between each other. The analysis of perceptions about post-PFM situations between VSS revealed that the four pairs of VSS namely Anapantham & Karikadavu, Anapantham & Kunchipara, Kunchipara & Karikadavu and Poovanchira & Kunchipara had no significant difference between each other.

It is evident from this study that JFM had positive impacts on livelihoods of the tribal communities in all the five VSS.

Summary

7. SUMMARY

Joint Forest Management is an important initiative taken by forest department in collaboration with local communities for the protection and management of forests. It has not only contributed to the restoration of degraded ecosystems but also in the regeneration of forest in many Indian states. In Kerala, it is known as Participatory Forest Management.One of the stated objectives of JFM implementation is the livelihoods improvement apart from improved forest cover. Joint forest management programme is implemented to involve rural communities in forest management and protection programmes and ensuring the local communities by sustained flow of benefits which helps to improve their livelihood. Monitoring of joint forest management is essential to understand its status, implementation, performance and impact. Many studies about the process of JFM has been carried out in India, but studies regarding the impact of JFM especially on livelihoods of local people are very rare. One of the objectives of this study was to understand the impact of PFM on livelihoods of selected indigenous communities under Central Forest Circle, Thrissur. The study also attempted a perception analysis about the pre and post-PFM situations as perceived by the community. The important findings regarding the study are outlined below.

1. Impact analysis of Anapantham VSS showed that after the implementation of PFM activities, there were improvements in the financial capital (0.6 to 0.72), physical capital (0 to 0.74) and social capital (0.23 to 0.66). At the same time a reduction was noticed in the natural capital (0.75 to 0.63) and human capital (0.79 to 0.6) compared to the pre-PFM situation.

2. Impact analysis of Karikadavu VSS showed that after the implementation of PFM activities, there were improvements in the social capital (0.37 to 0.79), financial capital (0.42 to 0.51) and physical capital (0.2 to 0.77). At

the same time, a reduction was noticed in the natural capital (0.8 to 0.75) and human capital (0.84 to 0.72) compared to the pre-PFM situation.

3. Impact analysis of Kunchipara VSS showed that after the implementation of PFM activities, there were improvements in the physical capital (0 to 0.21), financial capital (0.22 to 0.48) and social capital (0.4 to 2.8). On the other hand, the human capital (from 0.82 to 0.82) was unaffected. At the same time, a reduction was noticed in the natural capital (0.9 to 0.85) compared to the pre-PFM situation.

4. Impact analysis of Poovanchira VSS showed that after the implementation of PFM activities, there were improvements in the financial capital (0.37 to 0.56), physical capital (0.48 to 0.7), human capital (0.98 to 1.35) and social capital (0 to 1.01). At the same time, a reduction was noticed in the natural capital (0.8 to 0.68) compared to the pre-PFM situation.

5. Impact analysis of Vazhachal VSS showed that after the implementation of PFM activities, there were improvements in the financial capital (0.29 to 0.41), physical capital (0 to 0.71) and social capital (0 to 0.83). At the same time, a reduction was noticed in the natural capital (1 to 0.88) and human capital (0.9 to 0.77) compared to the pre-PFM situation.

6. Perceptions of local people regarding the conditions before and after PFM were different in the VSS. The difference in perception was highest in Poovanchira VSS, while the lowest variation was observed in Kunchipara VSS and Karikadavu VSS.

7. The highest variation in perception score was in Vazhachal VSS (from 84.67 to 41.67) and the lowest variation in perception score was in Poovanchira VSS (from 89.53 to 54.5).

8. PFM activities were not significantly different in the three pairs of VSS namely Anapantham&Karikadavu, Vazhachal &Anapantham and Vazhachal &Karikadavu.

9. No significant difference in four pairs of VSS namely Anapantham &Karikadavu, Anapantham &Kunchipara, Kunchipara&Karikadavu and Poovanchira&Kunchipara was observed.

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IMPACT OF PARTICIPATORY FOREST MANAGEMENT ON THE LIVELIHOODS OF INDIGENOUS COMMUNITIES

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ABSTRACT

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ABSTRACT

The present study "Impact of participatory forest management on livelihoods of indigenous communities" was conducted in five randomly selected VSS which were active in Central Forest Circle, Thrissur. The objectives of the study were to understand the impact of participatory forest management on livelihoods of indigenous communities. A perception analysis to know the pre-PFM and post-PFM situations as perceived by the community was also done. Sustainable livelihood analysis was the method used for the impact study. Primary data was collected through a pre-tested interview schedule. Secondary data was collected from forest department records, village records and from discussion with people.

The study revealed that PFM had a positive impact on the livelihood of the local communities in the selected five Vana Samrakshana Samithies namely Anapantham VSS, Karikadavu VSS, Kunchipara VSS, Poovanchira VSS and Vazhachal VSS. Impact analysis of Anapantham VSS showed that after the implementation of PFM activities, there were improvements in the financial capital, physical capital and social capital while a reduction was noticed in the natural capital and human capital compared to the pre-PFM situation. Impact analysis of Karikadavu VSS showed that after the implementation of PFM activities, there were improvements in the social capital, financial capital and physical capital. At the same time, a reduction was noticed in the natural capital and human capital compared to the pre-PFM situation. Impact analysis of Kunchipara VSS showed that after the implementation of PFM activities, there were improvements in the physical capital, financial capital and social capital. On the other hand, the human capital was unaffected. At the same time, a reduction was noticed in the natural capital compared to the pre-PFM situation. Impact analysis of Poovanchira VSS showed that after the implementation of PFM activities, there were improvements in the financial capital, physical capital, human capital and social capital. At the same time, a reduction was noticed in the natural capital compared to the pre-PFM situation. Impact analysis of Vazhachal VSS showed that after the implementation of PFM activities, there were improvements in the financial capital, physical capital and social capital. At the same time, a reduction was noticed in the natural capital and human capital compared to the pre-PFM situation. Perceptions of local people regarding the conditions before and after PFM were different in all the VSS. The difference in perception was highest in Poovanchira VSS, while the lowest variation was observed in Kunchipara VSS and

Karikadavu VSS. The highest variation in perception score was in Vazhachal VSS and the lowest variation in perception score was in Poovanchira VSS. PFM activities were not significantly different in the three pairs of VSS namely Anapantham &Karikadavu, Vazhachal &Anapantham and Vazhachal &Karikadavu before implementation of PFM. PFM activities were not significantly different in four pairs of VSS namely Anapantham &Karikadavu, Anapantham &Kunchipara, Kunchipara& Karikadavu and Poovanchira& Kunchipara was observed. Suggestions to improve the underperforming capitals in the various VSS include increase in number of work days, planting of trees, restrictions on waste disposal in the water bodies.

Appendix

Appendix I. Interview Schedule for impact study

Capital	indicators	Scoring					
		Before PFM			After PFM		
		3	2	1	3	2	1
Financial capital	1. Average wage per person						
	2. Average no of days of work availability						
	3. Wage income from forestry works						
	4. Profit from Vanashree / Other societies						
	5. Income from NTFP collection						
	6. No of persons having savings/ deposits in banks or any other units						
Physicalcapital	1. No of houses with :- a. Supply of electricity b. Vehicles c. Tubewells d. Water tanks e. Gas connections f. Toilets						
	2. No of houses without these amenities						
	3. No of functioning a.Tractors b.Water pumps						
	4. No of a.schools b.primary health centres						
	5. No of roads - a. Kutcha b. Pukka						
Human capital	1.Total population in the village						
	2. Total population : a. percentage of women b. percentage of youth c. percentage of children d. percentage of senior citizens (>60 years)						
	3. percentage of school going children 1. male 2. female						

	4. percentage of school age children who do not go to school		
	5.percentage of school dropouts		
	6.Percentage of child death in the village		
	7. no of people with wage income		
	8. no of people with salaried job		
	9.Higher education achievement if any		
	10. Female health status		

Natural capital	1. Total tree cover in the village		
	2. Water resources available in the village		
	3. Ecotourism and scenic spots		
	4. No of available non-timber forest products		
	5. Area of key NTFP collection		
Social capital	1. No of VSS meetings held in the village		
	2. Percentage of participation of women in the VSS meetings		
	3.Percentage of adult population participating in VSS activities		
	4.Frequency of interaction among people and authorities		
	5.Internet facilities in the village		

Appendix II. Interview schedule for perception analysis

SL. NO	INDICATORS	PRE- PFM					POST-PFM				
		1	2	3	4	5	1	2	3	4	5
1	Ecological condition of the forest										
2	Sustainable extraction of NTFPs										
3	NTFP marketing										
4	Illicit felling										
5	Co-operation between forest department and local people										
6	Interaction between forest department and local people										
7	Awareness about the importance of conservation and protection of forest										
8	Tree species diversity										
9	Incidents of forest fire										
10	Knowledge about tree nursery technology										
11	Managerial capacity										
12	Individual decision making power										
13	Participation of women										
14	Job opportunities through NTFP collection										
15	Job opportunities through ecotourism										
16	Migration of people for jobs										
17	Child education										
18	Overall education status										
19	Health awareness										
20	Overall standard of living										
21	Poaching										
22	Encroachment										