



**FACTORS AFFECTING FARMER'S PARTICIPATION ON PARTICIPATORY  
FOREST MANAGEMENT; THE CASE OF YAYO COFFEE FOREST BIOSPHERE  
RESERVE OROMIA REGION, SOUTHWEST ETHIOPIA**

**MSc. THESIS**

**BY**

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**Factors affecting farmer's participation on Participation Forest Management; the  
Case of Yayo coffee forest Biosphere reserve Oromia Region, Southwest Ethiopia**

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**MSc. Thesis**

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## **DEDICATION**

I dedicate this thesis to the family members and Woreda Administrative, for growing me up with love and being a constant source of inspiration without their effort and encouragement the thesis work would not be completed.

## STATEMENT OF THE AUTHOR

First of all I would like to announce that this thesis is my original work and that all sources of materials used in this thesis have been duly acknowledged. This thesis will be submitted in partial fulfillment of the requirements for M.Sc. degree at Jimma University, College of agriculture and veterinary medicine and will be deposited in the university library to be made available to borrowers under the rule of the library. I solely declare that this thesis will not be submitted to any other institution anywhere for the award of any academic degree, diploma or certificate. Brief quotations from this thesis are allowable without special permission provided that accurate acknowledgement of source is made. Request for permissions for extensive quotation from manuscript in whole or in part may be granted by the head of department of Natural resource Management or the dean of the school of graduate studies based on his or her judgment when the proposed use of the material is in the interests of scholarship. In all other instances, however, permission must be obtained from the author.

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## LIST OF ACRONYMS

CBO	Community Based Organization
FAO	Food and Agricultural Organization
FDRE	Federal Democratic Republic of Ethiopia
FGD	Focus Group discussion
GDP	Gross Domestic Product
GTZ	German Technical Cooperation,
JICA	Japan international Cooperation Agency
MDGs	Millennium Development Goals
NFPA	National Forest Priority Area
NGOs	Non -Governmental Organizations
NR	Natural Resource
NRM	Natural Resource Management
NTFP	Non-Timber Forest Product
OFWE	Oromia Forest and wildlife Enterprise
PFM	Participatory Forest Management
UN	United Nations
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific, and Cultural Organization
YCFBR	Yayu coffee forest biosphere reserve

## ABSTRACT

*The global forest has been declining from year to year due to human and natural factors. The Yayo district in southwest Ethiopia which is a biodiversity hotspot area historically containing a rich diversity of wild Coffee arabica cultivars and Afromontane forest species of commercial and scientific values. To address the problems of deforestation and forest degradation in the area, different protection strategies have been implemented through government and community in a coordinated manner. PFM plays an essential role to contributes natural resource conservation, income diversification and enhancing welfare of smallholder farmers. This study investigated the factors affecting farmers participation on participatory forest management in Yayo coffee forest. Two stage sampling procedures were used to select sample households for data collection. A total of 120 sample households were randomly selected. Data collection were used through group discussion, key informant interviews and transect walks in the study area. Descriptive and inferential statistics Model were used to identify variables determining decision-making Behavior of small holder farmers and empirical estimation of the econometric model, multicollinearity test for both continuous and dummy/categorical variables were conducted to check possible associations among independent variables. Both quantitative and qualitative data was collected from primary and secondary sources. The descriptive and inferential statistics models were used to analyze perception of household, and the level of participation in PFM, respectively. Among 12 explanatory variables hypothesized to determine farmer's decision to participate participatory forest management, the major top five ranked constraints face sample household during participation process found to be statistically significant. The result shows that duration of residence, perception house hold, forest distance from home and market, total annual income were affected farmer's participation. The study suggested the need tocreate a sense of ownership for farmers, strengthening existing benefit schemes and creating others benefit related to the forest resources improvement of rural infrastructures and timely providing information to improve household's participation in PFM practices.*

**Keywords:** *Farmers, Perception, Participatory Forest Management.*

# 1. INTRODUCTION

## 1.1. Background of the Study

Forests and woodlands contribute significantly to world economy. They provide multiple environmental, economic, social and cultural benefits which can provide opportunities for poverty alleviation and economic development. They also play an invaluable role in meeting the cultural and spiritual needs of adjacent communities. Forests' indirect but important benefits include acting as carbon sinks, reservoirs of biodiversity and critical habitats for wildlife. In addition, they keep the land productive by conserving soil and water. They also serve as water catchments that recharge rivers and dams which supply water for domestic use and hydro-electric power (Suleiman et al., 2017). The world's forests and woodlands are increasingly under pressure from the growing human population and many are shrinking as a result of human-induced deforestation (Guthiga et al 2006). The total global forest area has declined by 3%, from 4128 million ha in 1990 to 3999 million ha in 2015 (FAO, 2015; Keenan *et al.*, 2015). The annual rate of net forest loss halved from 7.3 million ha in the 1990s to 3.3 million ha per year between 2010 and 2015. The natural forest area declined from 3961 million ha to 3721 million ha between 1990 and 2015, while planting forest (including rubber plantations) increased from 168 million ha to 278 million ha (Keenan *et al.*, 2015).

The Africa total forest area is declining from 705 million ha in 1990 to 624 million ha in 2015. Due to both natural causes such as drought, fire, storms and disease, and human cause such as clearance for agriculture, over-exploitative timber harvesting, the expansion of settlements, and infrastructure development, natural forest area is declined within 25 years. But, planted forest area increased from year to year because of expansion of reforestation, afforestation and other forest rehabilitation, restoration and management strategies through community participation (FAO, 2015; Keenan *et al.*, 2015; Paynet *et al.*, 2015). About 95 percent of the total high forest of the country is located in three regions namely Oromia, SNNP and Gambela regional states (Yitebitu and Eyob, 2014). Ethiopia has been known by deep rooted extreme poverty, serious drought and deforestation for long period of time.

Degraded forest and land are rehabilitated through conservation of the remaining forest, woodlot development, planting of grass tufts, construction of micro catchments, and enrichment planting in degraded areas at participatory forest management on enclosures (Eshetu *et al.*, 2014). Similarly, rehabilitation of forests through forestation, agro forestry, construct soil and water conservation structures, reforestation and area enclosures with participatory forest management practices is another conservation efforts that the government is implementing (Badege, 2001; Demelet *et al.*, 2010; Adugnaw, 2014; Mulugeta and Habtemariam, 2014; Temesgenet *et al.*, 2015). Currently, degraded forest rehabilitation activities are implemented through community participation at Participatory Forest Management.(Gobeze *et al.*, 2009; Winberg, 2010; Alemayehuet *et al.*, 2015) and participatory enclosure management (Eshetu *et al.*, 2014). The government has shifted a policy towards forest management and rehabilitation from state centered approach to participatory or community centered approach for sustainable management and utilization of forests (Alemayehuet *et al.*, 2015).

The past governments who ruled the country particularly the Imperial Government (1930s-1970) and the Socialist Government (1974-1991) have been playing the leading role in practicing the activities that aggravate deforestation (FAO, 2012). The Imperial Government encouraged agricultural expansion through indiscriminate, individualization of forest resources to increase its tax revenue. FAO,(2012) indicated that during the Socialist Government all the forest resources of the country were nationalized by making itself, not only the exclusive owner, but also the sole forest developer. Since 1991 in contrast to the previous years, the State retreated from obligations it had assumed in previous years as forest custodian and developer without putting appropriate institutions in place (Bekele *et al.*, 2004). The past Government of the country tried to protect forest areas with restricted access for local communities (Bekele *et al.*, 2004). When looking such the approach from a social perspective, restricting access to forest resources and relocating communities living in forest areas is becoming more frequently considered as unsustainable from a social perspective (Yinger *et al.*,2007).



Participatory Forest Management (PFM) started in Ethiopia during 1990 with the help of NGOs (FARM Africa, SOS Sahel and others) to address deforestation thereby managing forest in a Sustainable manner (Said and O'Hara, 2010; UNDP, 2012; Temsgenet *al.*, 2015). It was first introduced to Ethiopia 27 years ago at Chilimo and Bonga forests as a pilot test; The major criteria used by the PFM team were: degree of participation and level of empowerment of communities; institutional and organizational set up of PFM and its strengths; impacts of PFM on livelihoods (socio-economic gains) and on the forest resource base (conservation and environmental gains); inclusion and protection of interests of disadvantaged groups and women; and the effectiveness of conflict resolution mechanisms. In Ethiopia, PFM is well adopted in 2010 including regional governments and at every woreda offices (Winberg, 2010).

Oromia National Regional State has the highest forest coverage in Ethiopia which most of resource found in south western part of the region (FAO, 2010). But, in the South-Western part of the region forest land is degraded due to agricultural expansion, population pressure, less land holding size of farmers and other factors. The Oromia region as well as Ilubabor zone is practicing rehabilitation of degraded forest land through area enclosures, tree planting, preparation of soil and water conservation structure through community participation in PFM areas and watershed development areas (Sisayet *al.*, 2010). This study is conducted to encourage smallholder farmer's participation in PFM practice at the Yayo coffee forest biosphere reserve Oromia National Regional State

## **1.2 Statement of the problem**

Forests are some of the key natural assets that provide a wide range of goods and services to the communities. Forests and woodlands contribute significantly to a country's economy. They provide multiple environmental, economic, social and cultural benefits which can provide opportunities for poverty alleviation and economic development (Suleiman *al.*, 2017). Loss of forests and woodland resources in Ethiopia is closely related to population dynamics and over-exploitation of wood products, conversion into agricultural land and other land uses. The greatest threat to our environment (forests and woodlands included) is however posed by poverty whereby people's basic needs for adequate food, shelter and health are not

met. Efforts to obtain basic needs under such circumstances generally lead to destruction of forests and woodlands. Unsustainable land use is also driving forest degradation which has negative impacts on the economy and livelihoods, exposing or vulnerable rural communities to desertification in Ethiopia. Natural and human factors are the main causes of forest degradation. Human causes are mainly growth of population, expansion of agricultural land, exploitation of existing forest product, overgrazing, expansion of urban areas and infrastructural development (Badege, 2001; Adugnaw, 2014; Temesgenet *al.*, 2015). The natural causes of forest degradation are drought, fires and diseases (Gobena, 2010).

Forest degradation has a number of consequences that affect livelihoods the community. The major impact of forest degradation are climate change, soil erosion, loss in water resources, decreased biodiversity, habitat loss and conflicts, fuel wood shortage and economic losses (Sumitet *al.*, 2012). The Yayo district is one of the biodiversity-rich regions in the country with a variety of flora and fauna species. Due to having the resource Expansion of commercial agriculture, population pressure, expansion of farming land, illegal logging and open-access resources of forest were major drivers for forest degradation. And also disagreements among beneficiaries of PFM approach due to unfair sharing of benefit and absence of uniform participation in forest development activities are challenging to the users. Lack of linkage among actors the absence of clearly defined property rights and user rights, gender disparity in participation and lack of active community participation and the absence of rules and regulation to penalize absenteeism, the conflict of interest on forest products among forest user group, differential power relationship among different actors at different levels and lack of clarity and overlapping responsibilities of institutions are among issues which undermine the success of participatory forest management practice in the area (Demelet *al.*, 2010; Eshetuet *al.*, 2014; Alemayehu *et al.*, 2015; Mengistu and Mekuria, 2015; Semeneh, 2015).

Different studies are not sufficiently point out factors or conditions for organizing effective and sustainable collective forest management. The dominance of conservationists' value over the values of local communities and other stakeholders mostly leads to misunderstanding among key stakeholders, in turn jeopardizes the success of conservation initiatives. The destruction of forest is leading to loss of biodiversity, the ecology and socio-economic crises

of the area. This has a profound negative effect on the livelihood of the rural communities and on the future existence of the forest. Hence, it requires to be studied intensively and empirically. Thus, the studies tried to fill this research gap of the study area

### **1.3 Objectives of the Study**

#### **1.3.1 General objective of the study**

To assess factors affecting farmers' participation in Forest management in Yoyu coffee forest biosphere reserve south west of Oromia National Regional State.

#### **1.3.2. Specific objectives**

- To analyze Demographic and socio-economic factors that are affecting people's participation on Forest Management in the study area.
- To assess farmers perception towards PFM in the support of their livelihood.

### **1.4. Research questions**

This research attempted to answer the following central research questions

- What are the Demographic and Socio-economic factors affecting people's participation on Forest Management in the study area?
- How is farmer's perception towards participation on Participatory Forest Management in support of their livelihood in the study area?

### **1.5 Significance of the study**

First, the study provides information at grass root level of household and concerned body about the determinant factors towards participation in forest management practice prospects of collective forest management, the appropriate institutional arrangements and to design entire appropriate strategy at all level to achieve community based forest management. Secondly, the finding of this research may decipher the complexity of local and state actors' interactions and their respective roles that need to be considered in any process of participatory forest management in Ethiopia to achieve the appropriate plan for sustainable forest management at all level. Thirdly, the finding of this research will hopefully be of scientific

contributions for those who are interested to make further studies in similar issues at different geographical settings and it will also help to inform policy makers on how to involve the local communities in forestmanagement activities.

### **1.6 Scope and Limitations of the Study**

Despite the fact that, participation in forest management activities' practice is a broad phenomenon, the study concentrates on the socio-economic, demographic, and biophysical aspects of household that affect participation of farmers' towards forest protection practices. Addressing all dimensions of factors affecting participation of farmers in forest management practices in this research is difficult due to limited financial resource and time. The study is also limited to 120 sample households in three kebelesof Yayocoffee forest biosphere reserve in Illu-Aba bor Zone of Oromia Region national state.

## **2. LITERATURE REVIEW**

### **2.1. Theoretical Background the study**

#### **2.1.1 The Natural Resource management approach**

In many parts of the world local peoples have been managing their natural resources based on their traditional knowledge or indigenous knowledge before the stewardship role of the state. This was because local people were able to manage natural resource through complex interplay of mutual benefit and support. Their indigenous knowledge and skill played great role in managing the resource (Tirhas, 2009). Nevertheless, the intervention of the state with their wholehearted interest to have control over those commonly managed resource brought disturbances to indigenous natural resource management system (Borrini-Ferabend, 2000). This has resulted in continuous forest degradation in the world.

#### **2.1.2 Participatory Forest Management (PFM)**

World forests have been degraded by about 40% since agriculture began (10,000 years ago) and three fourth of this loss occurred in the last two centuries (UN, 2005). Currently, only 30% of the Earth is covered by forests (UN, 2005). Moreover, 3% of the Earth's forest was lost between 1990 and 2005 and the rate of degradation is becoming more serious (UN, 2005). The battle against forest degradation is getting tough and challenging as the degradation rate worldwide from 2000 to 2005 was about 7.3 million hectares per year (Schulte et al, 2008). This is the same size of the West African country Sierra Leone. Participatory Forest Management (PFM) is a mechanism to protect forests and enhance the livelihoods of communities who use and benefit from them in the process and it was introduced as one of the solutions to solve the problem of open access to forest resources and promote sustainable forest management in the country through community participation. Some experiences from around the world show that shifts from state-centered policies toward solutions at the local level, such as PFM, resulted in successful forest conservation and development (Wily., 2002 and Khanal., 2007). Based on lessons learnt elsewhere, PFM was introduced to Ethiopia by some NGOs and donor agencies, notably FARM Africa, SOS Sahel, GTZ and JICA. These non-State actors attempted to respond to the prevailing forest management problems in Ethiopia through the introduction, adaptation and establishment of PFM projects. Indeed, the

introduction of PFM will be expected to achieve the dual goal of contributing to the sustainable management of the forest resources and the improvement of the socioeconomic status of the local community. The initial goal of the program was to supply forest products to local people on a sustainable basis, however, in the course of implementation, the program will be found effective in improving the livelihood of local community (Dhakal and Masuda. 2008).

### **2.1.3 The Meaning of Participatory Forest Management.**

The concept of resource co-management in general and forests in particular that incorporates State and citizen participation has been around for decades and has changed in theory, practice, and terminology over the past fifteen years (Farrigan, 2005). There are various definitions given to participatory forest management among different scholars. According to Weinberg (2010) Participatory Forest Management (PFM) is a mechanism to protect forests and enhance the livelihoods of communities who use and benefit from them in the process. Participatory Forest Management (PFM) is used as a broad term to describe systems in which communities (forest users) and government services work together to define rights of forest use, to develop ways of sharing management responsibilities, and to agree how to divide forest benefits.

PFM refers to the legal empowerment of local communities to manage forest resources for, in the first instance, their sustained livelihoods, and in the second instance, conservation value (Zelalem, 2005). Borrini-Feyerabend (2000) defines PFM as a 'situation in which two or more social actors negotiate, define and guarantee amongst themselves a fair sharing of the management functions, entitlements and responsibilities for a given territory, area or set of natural resources'. Through participation in collective resource management it is claimed that people can re-negotiate norms, challenge inequalities, claim their rights and extend their access (Cleaver, 2007). Taking into consideration about the role of communities in conservation as part of participation, benefit will be gained as conservation incorporates multiple scales of ecological, social, political, and economic concerns (Berkes, 2004).

#### **2.1.4 The importance of participatory forest management**

PFM attempts to secure and improve the livelihoods of local people dependent on forest resources by involving all stakeholders in the process of forest management, understanding their needs and situations, allowing them to influence decisions and receive benefits, and increasing transparency. But without clear property rights, as long as resources have value, they will be used in less than ideal ways and almost certainly will be degraded, often to the point where they end up close to worthless. Sometimes this phenomenon is called the “Tragedy of the Commons” and reflects the idea that potentially very valuable resources can be degraded when it is not clear who gets the products generated from natural resource investments and/or who has the right to control resources. Establishing clear property rights through appropriate institutional arrangements is therefore perhaps the critical prerequisite to enhanced tree planting, stewardship, management, and tree cover in many low income countries (Mekonnen and Randall B., 2008).

As scholars rightly put PFM is process oriented activities and in these activities the main actors are the government and community whether their roles and responsibilities can vary depending on the resource base (Borrini-Feyerabend, 2000). There is no generalized model for a successful PFM approach, but in principle should be based on the existing traditional use, management rules and traditional institutions (Irwin, 2004). of the different collective decision-making rules, those related to property rights have long been recognized as an important precondition for effective management of the commons. The original argument for increasing community participation in the improving of environment project arise from the need to better target people’s need, by including indigenous knowledge, and ensure that benefits are fairly divided and lower management cost (Irwin,2004). The economic reason behind PFM is that the communities will conserve forest resource if benefits of management action outweigh the cost of forest conservation. Therefore the issue is what benefit the communities are gaining out of involving themselves in the process of forest management or tree planting in some case (Zelalem, 2005). PFM is recommended to contribute to improved food security and poverty reduction; it could therefore have the potential to play a part in reaching two of the Millennium Development Goals; Eradicate Extreme Poverty and Hunger; and Ensure Environmental Sustainability (Weinberg, 2010). Behind the strategy lies an

assumption that forest areas that are managed by or together with rural communities are likely to have lower levels of forest disturbance and improved forest condition than areas that are either under exclusive state management or under open access regime (Tom, 2009). The general viewpoints of managing forest in common is to convince people of the benefit of sustainable utilization and by guaranteeing use rights to engage them in sustainable forest management. For this to be successful people must be convinced that it is indeed possible to maintain the resource over indefinite period of time provided use is regulated. Second, it must be possible to guarantee continued streams of benefit from forest products and services (Yonas, 2007). The forest products under PFM are the most important sources of income contributing to household per capita income and per capital cash income.

#### **2.1.5. Factors Affecting Peoples Participation in Participatory Forest Management.**

Yonas (2007) briefly states three basic factors that affect people's participation in participatory forest management. Each in turn is branched in to a diverse group of factors or variables. Resource Attributes: size of resource, clarity of boundaries, predictability of resource flow, condition of resource, ease of exclusion. Users attributes: size of communities, proximity to resource and market, group cohesion or heterogeneity, norms of behavior, available skills and knowledge of resources and historical events. Institutional arrangements: membership, access, appropriation, monitoring and sanctions, conflicts resolution decision making arrangements, relationships with external agents.

The dynamics of actor's interaction their interactions have positively or negatively impacted on the management process of forest. In addition to the above elements that determine the success of PFM, scholars (McKean, 2000 Yonas, 2007) further put the following elements that determine effective functioning of forest user group (FUG) under participatory forest management arrangements. Ease of excludability (cost of preventing others from using the resource) favors PFM which is related to size and clarity of boundaries. More homogenous, smaller close knit groups with intimate knowledge of the resource and history of successful collective action are likely to succeed (Grace, 2007). Simple flexible, fair rules that are supported by external arrangements are likely to favor PFM. Experience in many countries clearly indicates that when PFM is implemented appropriately, with sensitivity to local



conditions and the various attributes mentioned above, it produces significant result. Such as ecological result: conserving the natural resource, improve the extent of forest, increase ecological benefits like maintenances of local climate reduce erosion, and protect watershed; Economic: support rural livelihoods and so helping to alleviate poverty and also bring non-economic benefits such as experience, skill development etc for communities involved in the process (Zelalem,2005). Although PFM has several benefits to all stake holders, PFM is not solution; that is it doesn't provided a quick fix for forest conservation and it is not guaranteed to work in all circumstance (Zelalem, 2005). Ethnic composition, political ideology, and cultural with the community could create problems at the user group level. He further indicates that in order to have successful common property, every individual should have an equal level of participation in decision making. Within the common property resource management, participation of different interesting groups is important to minimize the risk ofexcludability to certain group of the people.

#### **2.1.6. Challenges and Constraints of Participatory Forest Management**

Participatory forest management needs different attentions to achieve the intended objectives. In addition to academic works that demonstrated the potential of PFM, there also existed a concern over the success and sustainability of these co-management initiatives. Especially when applied in wider scales and broader contexts, the performance of this strategy has been found to be varying and requires specific local and regional environmental context (Yonas, 2007).One of the prerequisites for successful PFM is local people's active and continued participation (Matta, 2005). Though the name PFM is used as a general term to indicate local involvement in forest management, its specific application and types of forests with in which itoperates vary widely. According to Yonas (2007), among the many of PFM arrangements in many of African counties, the diversity in group size, group cohesion, and proximity to marketis immense. The typology of PFM differs according to the communities' involvement ranging from simple consultation to contracts, consignment and joint venture. As such it is complex andhighly context specific which prevents the possibility of blueprinting the PFM process atoperational level (Yonas, 2007). As is when developing community based managementsystems, the appropriate definition of the community is also important. It is vital to assess whoare the relevant stakeholders rather than simply identifying all the stakeholders.

Communities are not homogeneous and efficient systems require thorough understanding of the internal structures and external linkages of the communities involved (Berkes, 2004). There is no easy correspondence between the community homogeneity and sustainable resource management (Grace, 2007). Another challenge in such venture is the reluctance of government bureaucrats to relinquish power to local communities, particularly where they think this would threaten their control over the resources and the actors' power relationship in PFM, where this thesis also explored. In participatory forest management, one needs to recognize community based resource management needs conducive environment and may become the most efficient land allocation system only under specific circumstance (Berkes, 2004). Setting up this type of forest management system becomes more challenging when participatory forest management is introduced in low value forest area (Castern, 2005). That is if conservation of the forest needs long term investment to obtain worthwhile.

#### **2.1.7. Perception and attitude towards PFM**

The successful conservation of forests is dependent upon the attitudes of the local people who are inherently connected with the forests and through their active participation in forest management. Previous benefits and values can affect the conservation attitudes and perception of the local people towards forest conservation and management (Gadd 2005; Kideghesho *et al.*, 2007). Thus, negative or positive attitudes and perception of local people towards PFM will likely affect their contribution and participation in the conservation and management of forests (Tesfaye 2011; Tesfaye *et al.*, 2012; Ameha *et al.*, 2014; Sirajet *et al.*, 2016).

The perception of farmers towards participation in PFM viewed from the angles of perceived benefits and participation obtained from the forest. Forest conservation and their effects, perceived from PFM approach, were the rules and regulation and perceived responsibility of community in the area as a whole for sustainable management of forest in the area. According to the key informants the rules and regulations, external support delivered from organizations and incentives given enable the households in forest conservation practices. In line this Girma and Zegeye, (2017) their result shows households (who was participant of PFM) perception towards PFM approach to improve the livelihood of farmers. Thus, most participants consider PFM as a vital activity for people and for the forests. The result coincides with the

study conducted by Tadesse and Abay, (2013) who indicate positive perception of households has a better influence on the level of participation in forest management at Alamata forest in Tigray region of Ethiopia. Similarly, the study conducted by Arowosoge, (2015) indicates that the perception of the community have a perceived positive relationship with the participation of communities in forest conservation in Ethiopia (Tesfaye *et al.*, 2012).

### **2.1.8. Determining Factors of Common Resource Management**

Huge amount of funds have been exerted to make the collective action towards management of common resources fruitful by both government and NGOs. Thus, there is a growing concern about the success and sustainability of common resource management approach. Many researchers have conducted researches about the major factors that determine the effectiveness of community based resource management. Almost all of them agree on one important factor, institutions, for the success of collective action in managing a common resource (Agrawal, 2001; Agrawal, 2006; Van Vugt; 2007). This does not mean that well-established institutions alone lead to success of common resource management approach. Researchers have further explored the determinants of successful collective action and come up with different factors (Agrawal, 2001. Gibson, Williams and Ostrom, 2005).

Agrawal (2001) only context specific factors that best explain the difference in establishment of PFM between Goba and Dello are discussed due to limited scope of this study. These are: total income, total forest income, income from sales of firewood, income from coffee, livestock income, perception/understanding about Community Based Organization, household size, hamlet( a place where the households reside), distance from forest and distance from market. Other factors, such as, understanding about the aim of livelihood diversification programme, households understanding about the benefits and costs of PFM, the role of traditional forest management system, performance of the staff, expansion of agricultural land and market demand of firewood were also expected to have an effect on decision of the households whether or not to participate.

The main role of the community includes conservation and utilization of the resources. On the other hand, PFM implies the need of clear and recognized access rights to this resources as well as multi stakeholder's agreement on the objective of forest management (FARM/SOS,

2008). In this study, the research tried to dig out the condition under which communities are willing to participate in PFM. When public agents and citizens have sufficiently different but equally necessary kinds of inputs, they can produce more efficiently by combining their efforts than either producing everything privately or everything publically”. The creation of synergy can be assured through involving local community in development. For the purpose of this study, participation is operationalized to mean joining the Community Based Organization or being a member of PFM. Empowering Civil Society for Participatory Forest Management in East Africa (2009) Participatory forest management includes many forms of partnership. The first one is collaborative forest management in which the community cooperates with the government. The second one is joint forest management in which the community lead agency and the community take over the duty of conservation of forest (Lawrence and Green, 2008).

FARM/SOS 2008 defines participatory forest management as “a system in which the communities (forest users and managers) and government services (forest department) work together to define rights of forest resource use, identify and develop forest resource responsibilities, and agree on how forest benefits will be shared.” For the purpose of this study, PFM is operationalized to mean the definition given by FARM/SOS. The main objectives of the programme (PFM in Yayu) are sustainable management of resource and improving the livelihoods of the community.

## **2.2. Empirical Background the study**

### **2.2.1. Common Resource Management**

Common resource management requires collective action, which in turn requires member cooperation to manage their resource effectively. The effort of commons in collective action is directed towards the achievements of common goals. Participants in common resource management face the dilemma of how to increase their own share of profit and at the same time contribute their best to the management of forest resource to stop further degradation through collective action. Developing a strategy to resolve the common good dilemma creates a “public good” from which every one may get a benefit regardless of her/his contribution to the management. This in turn encourages individuals to free ride in the management of

commons good. Deep in these incentives is the costs incurred and benefits generated by individuals through involvement in common resource management. Put it simply, economic factors are what mostly determine decisions of individuals. This in turn is influenced by different factors: nature of the resource, community characteristics and external factors (Agrawal., 2001; Agrawal, 2006). On the other hand, analysis of individual incentives to involve and contribute to the management of common resources is the most important explanation of the effectiveness of common resource management

The successful conservation of forests is dependent upon the attitudes of the local people who are inherently connected with the forests and through their active participation in forest management is reported by those authors (Tesfaye 2011; Tesfaye et al. 2012; Ameha et al. 2014; Siraj et al. 2016). This review noted that previous benefits and values can affect the conservation attitudes of the local people towards forest conservation and management (Walpole and Goodwin 2001; Gadd 2005; Kideghesho v et al. 2007; Tesfaye 2011; Tesfaye et al. 2012; Ameha et al. 2014; Siraj et al. 2016). Thus, negative or positive attitudes of local people towards PFM will likely affect their contribution and participation in the conservation and management of forests (Tesfaye 2011; Tesfaye et al. 2012; Ameha et al. 2014; Siraj et al. 2016).

### **2.2.2. An overview of the dynamics in Natural Resource management approach**

The past decade has seen the benefits of transferring control over natural resources from central governments to local bodies. Community based management and the empowering of local communities hinge on concepts such as co-management, using local/indigenous knowledge, recognizing local institutions and establishing a common property regime. Local users often have intimate knowledge of the resource and because their livelihoods depend on it, they have the greatest incentive to maintain the resource base (Tanuiet *al.*, 2007). In many parts of the world local peoples have been managing their natural resources based on their traditional knowledge or indigenous knowledge before the stewardship role of the state. This was because local people were able to manage natural resource through complex interplay of mutual benefit and support their indigenous knowledge and skill played great role in managing the resource (Tirhas, 2009). Nevertheless, the intervention of the state with their

wholehearted interest to have control over those commonly managed resource brought a disturbances to indigenous natural resource management system. This has resulted in continuous forest degradation in the world.

The initiation and concern for managing natural resource dates backs to the 1970s, since the emergence of alternatives development approaches. Different actors have attempted to treat the environmental problems with simple, neat solutions focusing on biological and or technical solution and neglecting the social dimension (Elias, 2004). Contrary to such views however, resource management comprises ecological, social, economic, legal, and political aspect in relation to community participation (Castren, 2005). Hence, management of forest resource needs participation of community around the forest. The centralized approach of the State adopted by the successive governments in Ethiopia to manage and develop forest resources appeared not compatible with communities' resources and their demands for forest ownership.

The approach also undermined the roles of local communities, their traditional institutions and knowledge in forest management practices, and considered local communities as enemies (destroyers) of the forests. Without the legal recognition of the right to use forest products, local people have neither the interest nor the courage in protecting and developing forests. Such systems would rather generate an incentive structure that force locals to irresponsibly exploit forests. Successive governments also failed to allocate sufficient human and economic resources to sustainably manage nationalized forests. Consequently, forest resources belong to the State *de jure* but they are *defacto* open access for all sorts of exploitation (Bekele, 2003).

In de-concentration the powers are transferred to lower level actors who are accountable to their superiors in a hierarchy and natural resource (forest) management role of 'power' is dominant (Ribot *et al.*, 2010). The exercising of power is a strategy used by various actors to gain access to and control over a set of resources. When actors do not share goals for conserving resources and are unequally powerful, institutions are significant to define the interaction among actors who create the institutions and to structure the interaction that take place around resource (Kassa *et al.*, 2009; Ameha *et al.*, 2014; Lemenih and Kassa, 2014).

Participatory Forest Managements (PFM) as more successful community based forest management is then introduced in 1990s. PFM is a mechanism to protect forests and enhance the livelihoods of communities who use and benefit from them in the process and it was introduced as one of the solutions to solve the problem of open access to forest resources and promote sustainable forest management in the country through community participation(Kubsaet *al.*, 2003; Temesgenet *al.*, 2007). (Wily,2002 and Khanal, 2007 And it is an agreed arrangement negotiated by government and local communities implemented through fairly divided management functions, benefits and responsibilities over a particular area of forest land to improve management, ensuring regulated access and use according to a jointly developed forest management plan(Tesfayeet *al.*, 2015).).

Ethiopia adopted PFM for three fundamental reasons: Constitutional in the constitution, the rights of communities to use natural resources is recognized, Practical the government does not have the resources needed to protect all state-owned forest resources, and Effectiveness studies concluded that deforestation and degradation rates are much lower in forests under PFM than in forests outside PFM (Kassaet *al.*, 2009; Amehaet *al.*, 2014; Lemenih and Kassa,2014). Based on lessons learnt elsewhere, PFM was introduced to Ethiopia by some NGOs and donor agencies, notably ( FARM Africa, SOS Sahel, GTZ and JICA(Zelalem, 2005).These non-State actors attempted to respond to the prevailing forest management problems in Ethiopia through the introduction, adaptation and establishment of PFM projects (Borrini-Feyerabend,2000;Yingeret *al.*, 2007). Indeed, the introduction of PFM was expected to achieve the dual goal of contributing to the sustainable management of the forest resources and the improvement of the socioeconomic status of the local community (Zelalem, 2005; Farrigan, 2005).

### **2.2.2 Community-based forest management**

Community-based forest management has been promoted during the Derg Regime. Several forests have been established during that period. However, those community-based forest development initiatives were not successful because of lack of clearly set objectives, absence of defined benefit sharing mechanism and weak community participation(Agrawal, 2001; Agrawal, 2006).Constitutes a powerful paradigm that evolved out of the failure of state forest

governance to ensure the sustainability of forest resources and the equitable distribution of access to and benefits from them. PFM introduced in 1990s and involves the participation of the local community living near and in a forest in all aspects of management and sharing of the benefits accrued from the sustainable management of the forest resources and to achieved effectively when local communities plan and implement these themselves instead of having the state, which has shown dismal performance thus far, continue to do so.

Participants in common resource management face the dilemma of how to increase their own share of profit and at the same time contribute their best to the management of forest resource to stop further degradation through collective action. Developing a strategy to resolve the common good dilemma creates a “public good” from which every one may get a benefit regardless of her/his contribution to the management. Other factors, such as, understanding about the aim of livelihood diversification programme, households understanding about the benefits and costs of PFM, the role of traditional forest management system, performance of the staff, expansion of agricultural land and market demand of firewood were also expected to have an effect on decision of the households whether or not to participate ( Endalew, 2016). CBFM allows the use of such local resources as indigenous knowledge and institutions in promoting sustainable forest management.

### **2.2.3. Conflicts of interest over forest product**

As different study showed conflict over control and use of forest resource are an inherent condition of forest dweller communities and resources utilized and managed by groups (Melaku, 2003; Christopher, 2013). The conflict is among members that have ill-feeling and dissatisfied due to the restriction imposed over the previous unlimited access. These ill-feelings sometimes intensified and create problem on participation in forest management (Zelalem and Mulugeta, 2012). The communities are unable to stop those intruders because they were continuously accused and no solution has been given to them for the crime they made. These groups also take offensive measure against the community who protect the forest in the form of direct attack and warning.



In different study non participant stated on this issue that when they raise about the right of membership they are not well-come by the committee (Melaku, 2003). Study conducted in Zimbabwe also showed that conflicts mostly arise from need for benefits, influence, recognition and legitimacy. Forest users need to have considerable power on the level of decision making on access to common resource and action like what to plant, protect, monitor or sanction (Mckean, 2000). The issue discussed with forest user was the decision making power and the democratic leadership of forest protecting committee in successful functioning of the forest Protection and management (Gebremedhin, 2008). Most of the problems raised by different studies were the issue of favoritism, mismanaging of money and making the confiscated firewood and charcoal from illegal group for personal benefit. Informant repeatedly mentioned that discussion and meeting are not passed through consultative participatory process (Edmund et al., 2002)

#### **2.2.4Lack of Tenure security and property regime**

The questions of claims based on customary rights for certain forest and NTFPs by people from Outside of the forest often complicate the working of forest user communities under PFM. Such problem arises often due to insufficient stockholders' involvement and negotiation at early stage of PFM (Malaku2003). There were people who have no land for agricultural purposes and these people were using forest and forest product for sale so as to sustain their life and feed their families. people who live nearby and adjacent to the forest collect dry wood for sale was vested to the poor and very poor as well as community who handed over 'their' agricultural land to use it as buffer zone of forest for community hinder the peoples participation (Yonas, 2007).

The issue of nonmembers who claim the use right over the forest resources was still not resolved. According to them, one important concept on non-user claim in this respect is that hinders forest protection and monitoring activities by user was that of installing traditional in forest grazing with their cattle only for their exclusive personal benefit (Yonas, 2007). After the implementation of PFM, they were excluded from forest use on the ground .Over all, the issue of non-forest users claiming traditional use right is found to have an adverse effect on community participation and remained to be one source of insecurity for members in

participatory forest management. PFM has brought a solution for the degradation of forests which used to be open access such as commercial wood for construction material, fire wood and grazing of livestock (Blakie, 2007; Tsegeye et al., 2009; Winberg, 2010).

#### **2.2.5. Lack of Government support**

The strong partnership between the community and the government is required in order to institutionalize a successful PFM scheme (Mulugeta, 2012). Although the forest management document elaborately discussed on the role of the government in safeguarding the interest of the community, the present level of partnership is too poor to allow such kind of engagement (Tsegayeat *al.*, 2009). The overall poor financial capacity and poor integration of woreda cooperative office, bureau of agricultural and rural development and forest protection enterprise of area to facilitate the process of co-management arrangement in order to support the community has also become a source of doubt (Yonas, 2007).

Most study sites responded that most community members still need overall technical and some training to empower them with participatory forest management skills. On the other hand, interview made with bureau of cooperative promotion expert have made it clear that securing additional budget for PFM is difficult as funds are hard to come by even for other more urgent activities (Berkes, 2004). Moreover, most community members feel that there is limited action being taken on those members who illegally cutting trees coming from the nearby villages and within village of the country. Besides the legal system was slow and some cases take long time and were dismissed altogether at the end for lack of sufficient evidence (Zelalem, 2005). They suspect that the Government may not be strongly committed to PFM and may not allocate sufficient resources to monitor and support the initiative.

#### **2.2.6 Clarity of boundary and related forest protection problem.**

Among many factors that influence the successful functioning of common property arrangements like PFM is the issue of boundary between users and non users (McKean, 2000). Such problem is very serious at Jijigaforest users where conflict over the forest resource has occurred (Wittmann, 2005). Different studies also disclosed that such boundary demarcation problem arose from the investigation and negotiation stage where the currently

excluded groups were relatively closer to the forest and the prime forest protection responsibilities had to be given to the nearby communities rather than distant since the establishment of PFM in the study area participation (Alemtsehay, 2010; Yemiru et al., 2011). Accordingly, dwellers adjacent forest to, who were excluded from the forest use right put pressure on the forest resource (Agrawal, 2006). The clearance of shrubs and trees at night near the farm land to expand agricultural land is commonly observed. These people always harvest construction poles and fire wood usually at night and get it smuggled to nearby towns and other smaller urban vicinity. Further, most acts of illegal collection wood and wood product for their daily life activities. Illegal expansion of farm land by the newly formed family members is also another problem (Endalew, 2016).

### **2.2.7 Alternative income source for livelihood improvement in PFM system**

As several project documents describe Farm-Africa (2004), one of the rationales for introducing the PFM arrangement was to ensure sustainable management of forest resources while improving the socio economic condition of forest-dependent local communities. Farm-Africa established tree nursery, initiated poultry and sheep husbandry and provided micro-credit to PFM members and capacity building for harvesting and marketing non-timber forest products such as spices and forest honey (FARM/SOS, 2008). According to Bekele *et al.*, (2007) stated that the income derived from agriculture was 2.5 times more than the income derived from that same source before the introduction of PFM (Farm-Africa, 2004). This agrees with a study from Adaba-Dodolla, which recorded higher income generated from agriculture by PFM households than by the non-forest user group similarly, the extraction of forest coffee and honey from the forest increased following the introduction of PFM.

Forest income is considered an environmental income according to (Ellis and Cavendish 2002; Vedeldet *al.*, 2007) made an elaborate case on the challenge of defining environmental income and finally settled for two alternatives environmental income as value-added (for conservation) or environmental income as rent (livelihood improvement). When defined as value-added, environmental income is the capture of value added in alienation or consumption of natural capital within the first link in a market chain, starting from the point at which the natural capital is extracted or appropriate (Vedeldet *al.*, 2007). Forest income is therefore

defined as value-added, both cash income and in-kind contributions, from the use of forest products and services. This in turn encourages individuals to free ride in the management of commons good. On the other hand, analysis of individual incentives to involve and contribute to the management of common resources is the most important explanation of the effectiveness of common resource management(Agrawal, 2006).

### **2.2.8. The stages of PFM**

One of the core elements in successful PFM exercising is the processes followed and steps attended in the preparation and implementation system. Lessons from PFMP prompt that realization of successful PFM involves three major stages known as investigation, negotiation and implementation stage (Alemtsehay,2010).

#### ***2.2.8.1. Investigation stages***

The stage involved various activities that include forest site selection on topographic map, field identification of the sites, gathering information on forest resources, past and present management practices and prevailing forest management problems, understanding about the forest uses, forest stakeholders (forest users), works on establishment of appropriate forest management institutes and their governance, and development of procedure for and field practice of Participatory Forest Resources Assessment and resource mapping. Use of diverse Participatory Rural Appraisal tools and techniques and numerous community meetings characterize the investigation stage, and these were employed to collect the right, relevant and sufficient information needed to appropriately setup PFM. Some of the major activities in this stage are described in the following sections

#### ***2.2.8.2. Negotiation stages***

This is the stage where different stakeholders are assisted to come closer and take decisions on various issues related to PFM based on consensus. It is, therefore, a decision making stage. Important features of the negotiation stage are: Bringing various stakeholders together: Use of local institutions in negotiation: Challenges and constraints faced during this stage: therefore it has been the challenging issues to bring all these stakeholders together for

negotiation and come to the compromise solutions which contributes for slow process of the PFM establishment and implementation.

### *2.2.8.3 The Implementation Stage*

Once the forest management agreement is signed, the management plan is implemented. When implementing FMP, it is essential that the community who takes the forest managerial task understand the field implementation of the different activities outlined in the FMP. In other words, the local community begin to take up roles used to be played by professional foresters. Skill development in turn requires joint field implementation of the FMP between professional foresters and the community. The implementation stage of PFM, enabling the community to carry out monitoring and evaluation of their forests is an essential aspect of capacity building (Zelalem and Mulugeta 2012). Monitoring requires continuous collection of data and inspection of management activities in order to measure progress. Evaluation on the other hand is a periodic review of all the data and information generated from monitoring system. However, for the locals to do these jobs, tailored training is essential.

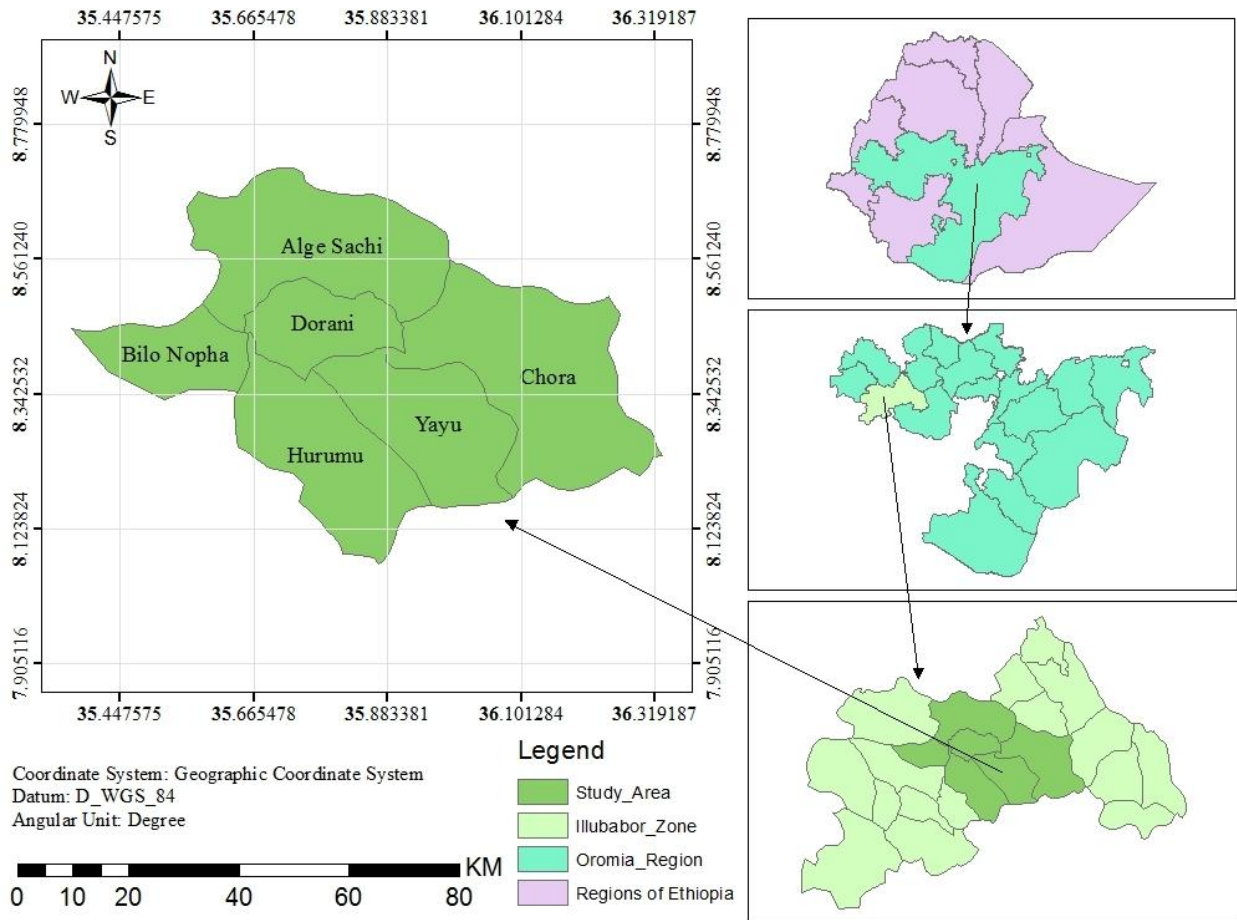
### 3. METHOD AND MATERIALS

#### 3.1 Description of the study area

##### 3.1.1 Geographical features and location

The study was conducted in Yayo coffee forest biosphere reserve situated in IlluAbbaaBoraazone of Oromia regional National state Figure 1: Map of YCFBR. . It is located at a distance of 560 km southwest of the capital city, Addis Ababa. The study area is bordered to the west by Gambella Regional State, to the east by the East Wollega and Jimma zones, to the north by West and East Wollega, and to the south by the Southern Nations, Nationalities, and Peoples' Region. The Yayo coffee forest biosphere reserve, which harbours a large proportion of the wild coffee arabica, genetic material and a considerable coal deposit, biodiversity rich and densely forested which is situated for the occurrence of a variety of flora and fauna species, including those endemic to the country and other biological diversity species (Senbeta, 2006).

According to Taye,(2002) the coffee forest stretches over six administrative districts: Yayo, Hurumu,chora,Doreni,Alge-sachi,BiloNopha and cover an estimated total land area of 1,353 km<sup>2</sup>.It lies precisely between 8° 2'42'' to 8° 31'18'' North and 35° 37' 48'' to 36° 05'18''East along the GebaRiver(Goleet *al.*, 2008). Deep river valleys, dissected by several small streams and three major rivers, namely Geba, Sese, and Saki, characterize the landscape of the study area. As for the topography, the area contains undulating mountainous terrains, rising and falling plateaus, valleys, and steep slopes (YDRADO, 2005). The altitude in the case study villages ranges from 1,100 meters at the bottoms of valleys to 2,337 meters at sea level (m.a.s.l) at the north-eastern higher elevation (Gole, 2003).



**Figure 2: Map of YCFBR**

### 3.1.2 Rainfall

The rainfall pattern of the study area varies annually from 1,191.6 to 1,960.7mm showing variations from year to year. It is a unimodal type of rainfall that increases from May to October and declines in November. The study areas have three climatic zones: These include 3.5 % (5,750.4 hectares) highland 85 % (138,465.85 hectares) mid-latitude (temperate) and 11.47 % (18,684.75 hectares) lowland. Such diverse climatic conditions and habitats partly contributed to the occurrence of high species diversity in plants and animals (Gole, 2003).

### 3.1.3 Local scale economic activities

As in many other rural parts of Ethiopia, agriculture, which is often typically characterized by mixed farming, is the main source of cash income and food for the majority of forest-dependent communities in the study area. Crop production and livestock rearing form the key

components of the rural livelihood strategies (YARDO, 2012). The cultivation of staple or cash crops that are annual or perennial in their nature is a key land-based livelihood activity performed by villagers (Senbeta *et al.*, 2013). Honey production activities in Yayo are carried out within the coffee forest contributing to both cash income source and subsistence needs of the local community (Gole, 2003). Regassa,(2000) reported that 92.6% of agricultural-dependent people in the district own wild coffee plantations in the montane rain forests. Local communities who reside near Yayo town are engaged in few other off-farm activities. These include employment in government offices, unskilled jobs in the coal mining and fertilizer factory and road construction projects(Abebaw and Virchow, 2003).

### **3.1.4 Human population and settlement**

The 2007 population census of Ethiopia conducted by Central Statistics Agency shows that more than 1.2 million people live in the Illu Abba Bora zone. The three districts, which have been covered by successive conservation programmes of the coffee forest, have a combined total population of 132, 177 with almost equal proportions of men and women. According to the (CSA, 2005) countrywide census report, the average population density of the Yayo district is 189, 6 people/ km<sup>2</sup>, a figure much greater than the zonal average of 72.3 people/km<sup>2</sup> (CSA and ORC Marco, 2006). It is estimated that the majority of these inhabitants (90, 8% or 120, 147) settled in the rural parts of the districts adjoining the dense coffee forest (CSA, 2007). It can be seen the migration of these social groups is either unplanned, which is economically triggered, or a state-induced resettlement programme that brought several thousands of people from different parts of the country to the district.

### **3.1.5 Land tenure and Land use types**

With Ethiopia known for its long history of agrarian production systems McCann, (1995), agricultural-related engagements in and around the Yayo coffee forest have also been progressively expanding in terms of both size and diversity. As a key factor of production, land plays a profound role in agricultural activities in the villages (CSA, 2014). The size of land alienated for agricultural and forest areas constitute the largest landscape mosaic in the area. This is further differentiated into various land-use types and intensities such as annual crops, farmlands, with scattered trees (including agro-forestry) home gardens with coffee and



shade trees, grazing lands and fallows (Gole, 2003). The rapid conversion of the forest ecosystem into cash crop farming land and coal extraction sites has become a serious concern for those interested in biodiversity conservation. There is a gradation of such conversions with the presence of smaller sizes of forestland, semi-forest coffee systems, home gardens, and farmlands with scattered trees (Gole, 2003). The Government has given a great deal of attention to address property right issues over land resources by way of endorsing various proclamations, regulations, policies, and strategies.

### **3.2. Research Design**

For this study reconnaissance survey and cross-sectional research design were used. A combination of qualitative and quantitative data collection method was employed. The quantitative data were collected from households by using semi-structured questionnaire. A qualitative approach were adopted, with a series of question formulated on various aspects of the forest conservation system and the local people participation, while a quantitative approach were used to study the relationship between perceptions and dependency on forest resources, and the relationship between the benefits received and the attitude to the PFM activities. Both primary and secondary source of data were used for this study.

### **3.3 Sampling Technique and Sample Size Determination**

The research unit of analysis was the household and the YCFBR was purposively selected because of presence of forest dependent villages, the fact that limited research had been done and kebele situated adjacent to the forest land for forest reserve. There are 14 kebeles in Yayu Woreda. Among 14 kebeles three kebeles Wabo, Bondeo-magela and Geci, were selected using a simple random sampling. From 940 total house hold live in three kebeles are 120 sample respondents randomly drawn from sampling frame using simple random sampling based on probability sampling proportional to size (Table 1). Stratified random sampling was used to select the number of household heads per kebeles. Generally 83 male and 37 female are selected. Among 120 despondences 79 participants and 41 are Non participants. Among 79 participants 49 male and 30 are female respondents and among 41 Non participants 30 male and 7 females' despondences were selected. The sample size of the households to be taken was calculated using the formula (Cochran, 1977)

$$n_o = \frac{Z^2 * (P)(q)}{d^2} \quad n_1 = \frac{n_o}{(1 + n_o / N)}$$

Where:  $n_o$  = desired sample size when population greater than 10000

$n_1$  = finite population correction factors less than 10000

Z = standard normal deviation (1.96 for 95% confidence level)

P = 0.1 (proportion of population to be included in sample i.e. 10%)

q = 1-P i.e. (0.9)

N = is total number of population

d = is degree of accuracy desired (0.05)

$$n_1 = \frac{(1.96)^2 * (0.1)(0.9)}{(0.05)^2} = 138.29$$

$$n_1 = \frac{138.29}{1 + 138.29 / 940}$$

$$\frac{138.29}{1 + 138.29 / 940} \rightarrow = 138.29 / 940 = 0.15 + 1 = 1.15 = 138.29 / 1.15 = 120$$

Based on Cochran (1977) population correction factors, a total of 120 (22 respondents from wabo, 44 from bondao-magela and 54 from geci ) sample household were selected using simple random sampling techniques from the total population of 940 (174 from wabo, 345 from Bondao-magela and 421 from Geci) for present study.

Table 1. Sample frame and sample size determination

Name of Kebeles	Total household head (number)	Number of sample household (number) participant and Non participant
Wabo	174	22
B/magela	345	44
Geci	421	54
Grand Total HH	940	120

### **3.4 Type of Data and Data Collection Methods**

Both primary and secondary data sources were used for the study. Primary data such as demographic, socioeconomic (education status, benefit derived or expected from forest (forest dependency), forest cooperative membership, institutional factors (rules and regulations, property rights, and extension services), perception of household and constraints) were collected through questioner. Secondary data were collected by reviewing the relevant material or documents such as scientific paper, book, reports and documentary source located in the study area. The data were collected from sample households through interview. During interviewing who are familiar with the study area, understand the native language and have prior experience in data collection were recruited. Those enumerators trained on the content of the questionnaire and data collection procedure. The data collected helped in testing the two hypotheses by examining how the different socio-economic and cognition variables were correlated and affected the dependent variables, such as perceptions and participation of local people towards the PFM activities in the study site.

### **3.5 Method of Data Analysis**

Data collected through various methods was analyzed by using both descriptive statistics and inferential model, to draw meaningful inferences about the problem under investigation. Qualitative data analysis methods: this was used to analyze the data collected through semi-structured techniques. Descriptive statistical analysis: depending on the available data at hand, data were coded, and subjected to analysis using descriptive statistics tools, such as the mean, standard deviation, percentage, frequency of occurrence, and Chi-square and Independent Sample T Tests. These tools were used to categorize and present quantitative data collected through the structured interview schedule. In fact, these made possible for the comparison and contrasting different categories of the sample units with respect to their desired characteristics through SPSS version 20 software. Binary Logistic Regression Model was used to identify variables determining participation and Non participation Behavior of small holder farmers. And models estimation of the econometric model, multicollinearity test for both continuous and dummy/categorical variables were conducted to check possible associations among independent variables (Gujarati, 2004). A statistical package SPSS version 20 was employed

to compute the variables values Therefore, in this study a binary logistic regression model is used to analyze the demographics and socio-economic characteristics factors influencing farmer’s decision to participants for PFM, in Yayu coffee forest biosphere reserve south west of Ethiopia.

The logistic distribution function for analyzing willing to participate or not participate can be defined as:

$$P_{BiB} = \frac{1}{1+e^{-z}} \dots\dots\dots(1)$$

Where  $P_{BiB}$  is the probability of being willing to cooperate for the  $i^{th}$  P user and  $Z_{BiB}$  is a function of  $m$  explanatory variables ( $X_{BiB}$ ), and expressed as:

$$Z_{BiB} = \beta_0 + \beta_1 X_{1B} + \beta_2 X_{2B} + \dots + \beta_m X_{mB} \dots\dots\dots(2)$$

Where  $\beta_0$  is the intercept and  $\beta_{BiB}$  are the slope parameters in the model. The slope tells how the log-odds in favor of being willing to cooperate for PFM change as independent Variables change. Since the conditional distribution of the outcome variable follows a binomial distribution with a probability given by the conditional mean  $P_{BiB}$ , interpretation of the coefficient will be understandable if the logistic model can be rewritten in terms of the odds and log of the odds, (Gujarati, 2004). The odds to be used can be defined as the ratio of the probability that a forest user will cooperate ( $P_{BiB}$ ) to the probability that he/she will not ( $1-P_{BiB}$ ).

The binary logistic model Responses to a question in relation to choice of being participate or not participate, such as whether forest user wants to be a participant of PFM or not could be 'yes' or 'no'. This is a typical case of dichotomous variable. A variety of statistical models can be used to establish a relationship between factors and user's willingness to participate to manage forest resources. Binary Logistic Regression Model was used to identify variables determining decision making behavior of forest users. And the empirical estimation of the econometric model, multicollinearity test for both continuous and dummy/categorical variables were conducted to check possible associations among independent variables. The two measures are often suggested to test the existence of multicollinearity.

These are Variance Inflation Factor for association among the continuous variables and contingency coefficients for dummy/categorized variables. VIF shows how the variance of an estimator is inflated by the presence of multicollinearity (Gujarati, 2004). A statistical package SPSS version 20 was employed to compute the VIF values. As a rule of thumb, if the VIF of a variable exceeds 10, there is multicollinearity. To avoid serious problems of multicollinearity, it is quite essential to omit the variable with value 10 and more from the logit analysis (Gujarati, 2004) These are Variance Inflation Factor for association among the continuous variables and contingency coefficients for dummy/categorized variables (Gujarati, 2004). Moreover, it is easy to interpret and it is a reasonable procedure even if some of the assumptions underlying it are not met in the data (see Annex table 4.1).

Contingency coefficients, which measures the association between dummy/categorical variables was computed. The values of contingency coefficients ranges between 0 and 1, with zero indicating no association between the variables and the values close to 1, indicating a high degree of association. Based on the correlation coefficient results, as it was shown in Table 4.2 there was no serious problem of association among the dummy/categorical explanatory variables.

Different goodness of-fit tests were also the other procedure, which were conducted to measure how the model adequately fits the data (see annex Table 4.1). As can be seen in (Table 5), as a first measure the likelihood ratio statistics exceeds the chi-square critical value at less than 1% probability level. As a second measure, the value of Pearson chi-square test shows the overall goodness of fit of the model at less than 5% probability level. Another measure of goodness of fit of the model is based on a scheme that classifies the predicted value of events as one if the estimated probability of an event is equal or greater than 0.5 and 0 otherwise. From all sample respondents, 86.9 were correctly predicted into participants and non- participants categories by the model.

Binary Logistic regression has got advantage over others in the analysis of dichotomous outcome variables. There are two primary reasons for choosing the logistic distribution. These are 1) from a mechanical point of view, it is an extremely flexible and easily used function, and 2) it lends itself to a meaningful interpretation. Therefore, in this study a binary logistic regression model is used to analyze the factors influencing farmer's decision to participate or

not participate on PFM, in the study area. Socio-economic status of the people is one of the barriers which limit local people's participation in participatory forest management. In this study, it is revealed that socio-economic characteristics of the forest user group members under participatory forest management scheme affect the community participation. This section presents the profile of the sample respondents with regard to the Annual income, duration of the residence, forest dependent, Landholding size, Livestock holding size, distance of home and market from the forest, and perception of the respondents in the study area.

## **2.6. Description of Variables and Respective Hypothesis**

### **Dependent variable**

Participation is the dependent variable of this study. Participation is operationalized as the involvement of a community in PFM.

**In Dependent variable:** The description of variables used in this study is presented below with their respective hypotheses. Demographic and socio-economic factors determining a supportive participation toward participation and Non participation to forest conservation system. In this study we hypothesize that respondents' participation of a given dimension of management is influenced by membership to social groups sex, Age, family size, level of education, duration of residence, total land holding, Annual income, Distance of forest to market, Distance of forest to home, livestock ownership, forest dependent, perception of forest benefits from forest resources.

### **Description of Variables and Respective Hypothesis**

**Age** Refer to age of the household head in years. The age between 28-38 years individuals realize that it is their responsibility to contribute to community activities whilst running their households according to the survey and they actively participate in forest conservation through community participation. **Sex** Refers to the sex of the household head, and it is a continuous variable. Female-headed households benefit less from community forests; in addition, women suffer more in the absence of rules for equitable distribution of benefits. Therefore, this variable is hypothesized that women headed households show high participants than their male. **B/se** equally sharing responsibilities in participation of women and men in PFM. **Family size** Refers to the number of members who are currently living within the family

and this variable is continuous. It is an indicator for availability of labor provided that the majority of the family members are within the age range of active labor force. Availability of labor in the household is one of the important resources in collective forest management. Based on this assumption, this variable is hypothesized to have positive relationship with collective forest management.

Education this variable represents the years of the household 1-4,5-8,9-12. The study assumes that forest users who have relatively high levels of education are more likely to form groups for collective forest management positively because they understand the danger of ecological and social crises of forest destruction. Therefore relatively educated households show better participation for collective forest management Annual income this refers to annual farm income obtained from sale of forest products and it is continuous variable. An economic variable like income is important when households have to make a fair contribution to community activities. Thus, expected hypothesis was when the household income increases the individual tendency to participate in collective action increases participate positively to PFM activities.

Landholding Refers to the area of land the household owned and it is measured in ha. It is a continuous variable. Thus, expected hypothesis tested was people with large landholding decrease the probability of individuals' trusting behavior in the community. Thus, it was expected that Landholding of the household has negative with the participation of collective forest management. Livestock holding size refers the highest number of livestock owned by the households and it is measured in number. Respondents who have high amount of Livestock and feed resources had a negative impact on participation in forest management activities would increase the intensity of participation, the probability of participation in participatory forest management. Distance of home from forest was measured by the time spent to reach the forest and it is continuous variable. For those who are far away from the forest, it may be difficult to equally participate with those who are inside the forest in forest protection; hence, respondents who travel for an hours to reach the forest may decide not to participate. Thus, it was expected hypothesis that respondents far from the forest would have no interested to participate in PFM. Distance from market was measured by the walking time

from the nearby markets. Market integration is important for raising rural income and forest values. Distance can affect negative collective action on forest management activities.

Perception of the community was measured by the level of understanding of the community about the major activities in formation of PFM. The perceptions of the community towards PFM positively affect collective action to participate to forest management activities. Duration of residence in the locality this refers to the household's duration of stay in the village and it is continuous variable. New settlers to a region may simply learn and accept the rules of the established group, and their cultural differences do not affect their participation in governing a forest. On the other hand, new settlers are frequently highly disruptive to the sustenance of a self-governing enterprise. The difference in the skills and knowledge of different kinds of users frequently prevents them from arriving at agreements about how to allocate harvesting quotas over time. Thus, it was expected that that duration of stay in the locality positively for PFM. Forest dependence Most of the users of timber and non-timber forest products engaged in different livelihood would be depend on forest activities to change their livelihoods of the household. The expected hypothesis that respondents with high forest dependence had negative attitudes towards managing the forest via participatory approach..

### **Description of Variables and expected Hypothesis**

This section presents the summary results of demographic, socio-economic and physical factors of sample respondents in the study area (Tables 2).



Table 2. Summary of descriptive and inferential analysis results

Code	Variables	Type of variables	Expected sign
<b>Dependent variables</b>			
PARTIC	Community Participation in forest conservation index score (Measured in Number of stakeholders. involvement in the project Up to date contributions Consistency in workshop, meeting, field activities attendance )	Ordinal	
<b>independent variables</b>			
AGEHH	Age of household head(Years)	Continuous	+
SEXHH	Sex of household head (1=Men and 0=Women)	Dummy	+
HHSIZE	Household size (Number)	Continuous	+
EDUSHH	Education status of household head (1= literate and 0=illiterate)	Dummy	+
AINCOME	Annual income(Birr)	Continuous	+
LANHSIZ	Landholding size (Ha)	Continuous	-
LIVHSIZE	Livestock holding size (TLU)	Continuous	+
DISFHOM	The distance of forest from home (Kilometer)	Continuous	-
PERCHH	Perception of household head (1= Agreed and 0=Disagreed to participate)	Dummy	+
DURARESID	Duration of residence(years)	Continuous	+
FRSTDEP	Forest dependence	Dummy	-

## 4 RESULTS AND DISCUSSION

This chapter presents the findings obtained from the study.

### 4.1 Demographic and Socio-economic Characteristics of the respondents.

This section presents the summary results of Demographic and socio-economic factors of sample respondents in the study area. The results on Table 3 shows that summary of dummy explanatory variables influences participants and Non participants of farmers in PFM activities of study area.

#### 4.1.1 Categorical variable

Table 3. Explanatory variable

Explanatory Variable	Participants		Non-participants		THH	ALL (%)	X <sup>2</sup>	Sig.
	Frequency	%	Frequency	%				
SexHH								
Female	30	81	7	19	37	100	5.529	.019
Male	49	59	34	41	83	100		
Total	79	100	41	60	120	100		
Perception								
Positive	55	45.8	16	13.3		59.2		
Negative	24	20	25	20.8		40.8	10.458	001
Forest dependant								
Yes	35	29.2	31	25.8		55	10.688	0.001
No	44	36.7	10	8.3		45		

Source: Survey data, 2019

The studies have shown that demographic and socio-economic backgrounds of individuals are associated with their participate and Non-participate behavior of the society. The work of Bwalya, (2004) demonstrates that socio-economic and demographic characteristics such as age, income, landholding, education level and household size have varying influence on the participation and non-participation of the community. These attributes of people seem to play

a key role in building the social capital, which is important for the socio-economic development of the community in many developing nations. Diwakara, (2006) also indicated that the trusting or need of peoples participation behavior of individuals in rural area is affected by their social, economic, and demographic characteristics. Economic variable like income and landholdings are important when households have to make a fair contribution to community activities. McKean, and Ostrom,(2008) have also mentioned that social heterogeneity influences participation and non-participation of collective action and it is expected to have negative and positive effect on participation, because different social norms may make creating and enforcing decisions more costly.

#### *4.1.1.2 socio-economic*

Among socio-economic activities in rural parts of Ethiopia, agriculture, which is often typically characterised by mixed farming (crop production and animal rearing), is the main source of cash income and food for the majority of forest-dependent communities in the study area. Wild coffee is also another essential crop, contributing to both cash income source and subsistence needs of the local community (Gole, 2003). Regassa,(2000) reported that 92.6% of agricultural-dependent people in the district own wild coffee plantations in the montane rain forests. Honey production activities in Yayo are carried out within the coffee forest and are mostly rudimentary. Unpublished research conducted by Regassa (2000) reveals that farming households that have coffee in the forest could harvest up to 57.3 kg of honey per year per household. Local communities who reside near Yayo coffee forest are engaged in few other off-farm activities including employment in government offices, unskilled jobs in the coal mining and fertilizer factory and road construction projects. Some of demographic characteristics which affect people's participation on PFM activities are as follow.

#### **4.1.1.2 Sex**

The sample respondents considered during the survey was 120. In general participate and Non-participate respondents 37 are female and 83 are male. Among 120 respondents 79 participate 30(81%) are female and 49(59%) are male respondents and 41 non-participate 7(19 %) are female and 34(41 %) are male respondents participate on PFM in the study area. As Table 3 shows, 59 % of male and 41% female households agreed to participation to forest

management practice. So, the study similar to expected hypothesis that sex of household have negatively affect people's participation on PFM. Because of absence of equally gender participation. Based on these arguments, it was anticipated that male headed households would be more likely to participate than female-headed households. Also the expectation, the proportion of female-headed households' decision to engage in PFM found to be lower than male-headed households. The possible explanation is, to the extent that the forest products are not scarce, women may not compelled to go far in search of forest products thus they do not have special interest for participation.

#### ***4.1.1.2. Family size***

Availability of labor in the household is one of the important resources in collective forest management. This could be attributed to the fact that when family size increases, households want to expand their agricultural land and, thus, they are not interested to participate in PFM due to which restricts getting access to the forest land for expanding agriculture and illegal use of forest product. Moreover, those that had shortage of fuel wood assumed that they could easily get access to the forest if the PFM was not implemented. So, the study contrary to expected hypothesis that large family size have negative affect respondents on PFM participation. However, as shown in Table 4 the mean family size for the sampled population is found to be 4.9 with a standard deviation of 2.4. This mean family size is above the national average family size of 4.7 persons per household (CSA, 2007). Furthermore, the mean family size for non-participation and participation households on PFM group is found to be, 4.9 and 5.3, respectively. The mean difference of family size between the groups is statistically significant ( $p < 0.05$ )

#### ***4.1.1.3 Age***

Many studies in collective action show that young and middle-aged individuals realize that it is their responsibility to contribute to community activities whilst running their households (Bwalya, 2004) the finding showed that the average age of the respondents was 39.68 years. The average age of the non-participant sample respondents was 37.81 year whereas the participant sample respondent's average age was 40.85. The two sample t-test result also revealed that there was no significant difference between participant and Non-participant in

participatory forest management practices in terms of average age of respondents in the study area. Thus, study similar to the expected hypothesizes that relatively young and middle-aged respondents have agree on participatory forest management.

#### ***4.1.1.4 Education status of respondents***

The study assumes that forest users who have relatively high levels of education are more likely to form groups for collective forest management because they understand the danger of ecological and social crises of forest destruction which bring change on their daily activities. The survey result showed that about 43.6% educational status of sampled households heads were illiterate; while 56.4% of the sample households were literate. Similarly, 44.4% of the illiterate sample households and 55.6% of the literate sample households were non-participants of PFM practices. On the other hand, 43% of the illiterate households and 57% of the literate sample respondents were participants in the study area. The study finding that high level of education house hold have better to participation on PFM activities. Similarly to the expected hypothesis anticipates that relatively educated households show better participation for collective forest management.

#### 4.1.2 Continuous variable

Table 4. Demographic and socio economic Characteristics of the respondents

Variables	Variables description	Mean			Mi	Max	t-test sig. (two-tailed)
		participati on (Y=1)	Non participation(Y=0)	Grand mean			
FAMSIZE	Number of people in the HH	5.37 (2.37)	4.19 (2.55)	4.8 (2.4)	2	9	-2.529
AGE	Age of the HHH in years	45.84 (8.25)	44.87 (7.49)	45.4 (7.90)	28	67	- .24(NS)
EDUCHH	Education level 0=illiterate, 1-12, 12+	4.92 (2.59)	4.80 (2.56)	4.8 (2.57)	1	10	- .630(NS)
DURARESID	Duration of residence in years	25.6 (13.2)	19.92 (13.11)	23 (13.2)	3	59	-2.24
TOTALLAND holding	Total land size in hectares.	2.75 (0.99)	3.17 (.75)	2.9 (.87)	1	4	2.239
THHINCOME	Total annual (2000/01) income in birr	9851 (9114)	9576 (4080)	9713.5 (6597)	47	2200	- .364
MARKDIS	Distance from the market center in km	2.58 (1.21)	2.42 (1.17)	2.5 (1.2)	0.5	5.25	- .075(NS)

ROREST	Distance	1.21 (.73)	1.71 (.75)	1.46	.25	3.5	3.458
DIS	from the forest center in km			(.74)			
TLIVESTO	Total	6.49	5.7 (3.6)	6.1	0	24	1.066(N
CK	livestock	(3.90)		(3.75)			S)

*Note: Standard deviations are in parentheses*

Source: Survey data, 2019

NS = Not Significant

S= significant at 5% probability level

The maximum likelihood estimates of the binary logit model estimated groups of participation and non-participation of forest users accurately.

Table 5. The maximum likelihood estimates of the binary logit model

<b>Variable</b>	<b>Estimated Coefficient</b>	<b>Standard Error</b>	<b>Odds-ratio</b>
SexHH	-0.199	1.249	0.820
AGE	0.273	.146	1.314
FAMSIZE	-.118	0.220	0.889
EDUHH	-0.200	0.329	0.818
DISTTOMARK	0.299	0.570	1.348
DURARESI	0.135**	0.058	1.144
TOTALLAND	-.681	0.837	0.506
TINCOME	-.003***	0.001	0.997
PERCEP	5.708**	2.104	301.242
FORESTDEP	3.986*	1.837	53.860
TLU	-.168	0.198	0.846
DFFTOHOME	-3.32*	1.357	0.036
N		120	
-2 Log Likelihood Ratio		129.011	
Pearson chi-square ( $\chi^2$ )		121.267(12) ***	
Correctly Predicted (Count R2)		86.9	
Sensitivity		96.2	
Specify		87.8	

Source: Model Output

\*, \*\*, \*\*\* Represents significant at 10%, 5% and 1% probability level

The results of this study confirm that the decision to participate or Non-participate. For participatory forest management areas is influenced by the simultaneous interaction of many socio-economic and demographic factors. As it is presented in Table 4 out of 12 explanatory variables hypothesized to determine farmer's decision to participate participatory forest management, some of them are found to be statistically significant. The result shows that while total annual income and forest distance to markets & home to were negatively affect farmers participation and statistical not significant, the perception of peoples of house hold on



forest condition, household's dependency on forest product and duration of residence are positive and significantly associated with willingness to participate at different significance level for collective forest management in the study area.

#### ***4.1.2.1 Annual income***

Total income obtained both from forest products sale and other livelihood diversification of their activity in the production year is used to measure the relative impact on participation behavior of forest users. The results revealed in contrary to expected hypothesis respondents with high annual income had negative attitudes towards managing the forest via participatory approach. This is because they gave less emphasis about the PFM by only considering its economic importance. This could be due to the fact that they think only for their private lives and immediate benefits rather than considering the benefits of the general public and also the long-term benefits that could be generated when forests are managed through PFM Samuel, (2004). As the result shows that farmers with high income are aware further about the negative impact of deforestation on their livelihood activities' so they want to protect before clearing of the forest. Wondimagegnehu, (2009)

#### ***4.1.2.2 Duration of residence***

Duration of household's stay in the village and that affect the participation of farmers on participatory forest management. The econometrics result indicated duration of residence has positive and significant relationship with participate behavior at less than 5% probability level suggesting peoples who live long time are more participate collectively than those who live few years in the local area because they share experience from other place. So, the study similar to expected hypothesizes that duration of peoples stay in the locality positively affects people's participation at participatory forest management. Similar result was reported by Tesfaet *al.*, (2003) in Nepal. Similarly, Simenhet *al.*, (2016) indicated settlement condition of a household was positively and significantly influenced participation in forest conservation activities. This suggests that settlers who were brought by resettlement program from various regions of the country were participating in participatory forest management.

#### **4.1.2.3 Forest dependence**

A Forest product provides both direct and indirect benefit. According to the survey total sampled house hold 55% of them their livelihood activities' depend on the forest the remaining 45% didn't depend on forest. Among 79 participants dependence 35(29.25) are dependent and 44 (36%) are not dependent and among 41 non-participants respondents 31 (25%) are dependent and 10 (8.3%) are not dependent. The Forest dependence had a negative effect and statistically significant at 10% level that satisfies the prior expectation. Most of the users of timber and non-timber forest products engaged in different livelihood activities such as beekeeping, cattle fattening, milk production and other activities through PFM in cooperative manner to improve their livelihoods of households. And similar to expected hypothesis revealed that respondents with high forest dependence had negative attitudes towards managing the forest via participatory approach. The result shows contrary to expected hypothesis which affect positive and statistically significant. The prevailing shortage of land was initiated farmers to diversify forest-based incomes through managing the forest in a sustainable manner. Among the most prominent perceived benefits to the local people due to the presence of PFM were, aesthetic and recreational value, employment opportunities, source of income from visiting eco-tourists, traditional beehive keeping and source of honey and source of fodder for livestock through cut-and-carry system and wood products. contrary house hold whose daily economic activities' depend on forest would not want to participate for forest management collectively because they fear to lose customary right of forest control and restrict them from illegal use of forest product (Habtemariam *et al.*, 2009). Similarly; to the study (Blayet *et al.*, 2008, Tadesse and Abay, 2013, Eshetu *et al.*, 2014, Alemayehu *et al.*, 2015) stated that the degree of dependence between participants and non-participants households is statistically significant and positive to use forest product in sustainable manner to change their livelihood through forest dependence.

#### **4.1.2.4 Landholding size**

The study anticipates that landholding of the household has negative correlation with the emergence of collective forest management. On average, 2.89 ha mean difference is observed between the two groups. The result shows that large land holding have negative and not significant impact on household's decision to participate in PFM at less than 5% probability

level. The study similar to expected hypothesis the respondents who have enough grazing land had negative attitudes towards the concept of PFM. One possible explanation is that they may fear that the introduction of PFM will inevitably restrict diversification of agricultural land, minimize the area of grazing land in the future and this could be due to the fact that they think only for their private lives and immediate benefits rather than considering the benefits of the general public. Moreover, they considered the forest as the habitat for the wild animals and insects that damaged their crops. They also wanted to maximize their crop lands on the indiscriminate clearance of the forest. In contrary, the respondents who have no crop land and grazing land had positive perception towards the concept of PFM and the introduction or implementation of PFM in the area will maximize the income of the community in the future.

#### ***4.1.2.5 Livestock holding size***

The variable had a negative sign and statistically not significant at 5 % level which satisfies the prior expectation. The highest number of livestock owned by the households requires a high amount of feed resources. So, they want to participate on forest management activities actively. Because of the major feed resources utilized by the household were grasses, crop residue, trees and shrubs. Therefore the source of grasses and trees and shrubs are obtained from an enclosed forest area of PFM. The major livestock feeding system in the study was the cut and carry system due to the absence of grazing land. The study contrary to expected hypothesis the respondents who have enough livestock had better interest towards the concept of PFM. The marginal effect implies that an additional of livestock in Tropical Livestock Unit would increase the intensity of participation, the probability of participation and both participation and intensity of participation in participatory forest management by 6.22 unit, 5.7%, and 6.4 unit, respectively Musyoki *et al.*, (2013) in Kenya and Oli and Treue, (2015) In Nepal. The respondents who had a high number of cows would be more interested participate actively to PFM activities.

#### ***4.1.2.6 Distance of forest from market***

This section one of the factors which limits local people's participation on participatory forest management. Market integration can negatively affect collective action participation to forest management activities. Respondents who are very close to the market have no better expectation to join PFM activities. Promoting forest production with market integration are

important for raising rural income and forest values, but rapid market integration is often associated with higher rates of forest clearance. In the long-term, market integration will raise pressure on open access, illegal extract of forest product and weaken collective forest management (Bwalya, 2004). However, this variable has significant impact on participation behavior of users in the study area. Thus, this study implies that integration to market i.e. proximity to market center similar to expected hypothesis that negatively affect collective forest management. Because, brings less participation of community, aggravate deforestation due to illegal forest use and open access.

#### ***4.1.2.7 Distance of forest from home***

Distance of the forest from the home had a negative impact on farmer's participation on protection of forest activities at 10% level of statistical significance. The household far from the forest did not benefit from the forest because it requires additional cost for transportation of grasses/other forest resources. The result is consistent with others studies conducted by Tadesse and Abay, (2013) in Ethiopia and Musyokiet *al.*, (2013) in Kenya. They found a negative relationship between distances of a household's home from the forest and participation in forest management and protection practices due to information asymmetry and rare benefits obtained from the forest. The negative sign indicates that when distance of forest areas is increased community participation is decreased because collective activities' need energy, time and costs for contribution of participation in PFM activities in the study area. In addition, distant farmers might have limited access to agricultural extension services; and this undermines the potential benefits of using forest management practices to reduce the high level of risk on forest and forest production.

#### **4.2. Farmers Perception towards PFM in support of their livelihoods**

This section one of the factors which limits local people's participation in participatory forest management. This section presents the profile of the sample respondents with regard to the perception of the community towards PFM to change their livelihood in the study area. The Perception of household had a positive relationship and was statistically significant at 5% level. Among 120 respondents 79 participants and 41 not participants in participation of PFM were surveyed from study area. Among 79 participant's respondents PFM to change their

livelihood are highly participants 43 medium 24 and low 12 according to survey from study area. And among 41 not p participants respondents all have low participants of PFM expectance to change their livelihoods. Marginal effect implies that participant's respondents to participate increase compared to not participant's respondents of participation in PFM practice by 66% and not participate 34% in the study area.

The perception of farmers towards participation in PFM viewed from the angles of perceived benefits and participation obtained from the forest. Forest conservation and their effects, perceived from PFM approach, were the rules and regulation and perceived responsibility of community in the area as a whole for sustainable management of forest in the area. According to the key informants the rules and regulations, external support delivered from organizations and incentives given enable the households in forest conservation practices. In line this Girma and Zegeye, (2017) their result shows households (who was participant of PFM) perception towards PFM approach to improves the livelihood of farmers. Thus, most participants consider PFM as a vital activity for people and for the forests. The result coincides with the study conducted by Tadesse and Abay, (2013) who indicate positive perception of households has a better influence on the level of participation in forest management at Alamata forest in Tigray region of Ethiopia.

Similarly, the study conducted by Arowosoge, (2015) indicates that the perception of the community have a perceived positive relationship with the participation of communities in forest conservation in Ethiopia (Tesfaye *et al.*, 2012). This could be due to interest to know and participate in PFM increases with increase in the level of education. Moreover, respondents who had shortage of fodder for their livestock had better perception towards the concept of PFM. This could be attributed to the fact that, if the forest is protected by PFM system, they will be benefited during hardship period. Moreover, perception of local people towards PFM are influenced by previous benefits (access to and control over resources) due to PFM implementation in the area, knowledge of respondents about past forest management system, knowledge and experience of respondents about PFM implementation, knowledge of the respondents about the problem with the existing PFM system, distance from the edge of the forest and the residential area of the respondents about managing forests via participatory

approach (Winberg 2010; Tesfaye 2011; Tesfaye *et al.*, 2012; Takahashi and Todo, 2012; Ameha *et al.*, 2014; Siraj *et al.*, 2016; Tadesse and Kotler, 2016). In contrast to this Tesfaye, (2017) households did not favor the implementation of restrictive measures towards the access to forest resources and they perceived PFM is anti to their customary right of forest use and control. As far as people residing in and around the forest believe that forest conservation and management is not their duty, they may not act collectively and bear the responsibility.

Most of the users of timber and non-timber forest products engaged in different livelihood activities such as beekeeping, cattle fattening, milk production and other livelihood activities in individual and forest participant manner. The prevailing shortage of land was initiating farmers to diversify forest-based incomes to change their livelihood through managing the forest in a sustainable manner. They found that benefits obtained or expected from the forest such as timber and non-timber forest products serve as incentives for the households to engage more in forest management practices. Both direct (grasses, beekeeping, dead fuel wood and money from hunting) and indirect benefits (reduction of soil erosion and floods coming from upper stream, access to irrigation and training on forest management and protection) were obtained from the forest area. The improvement of groundwater resources entails farmer's access to irrigation and changes the participation of farmers towards actively participating in forest indirectly respondents using irrigation activities to change their livelihoods activities through PFM. The result coincides with the study conducted by Tadesse and Abay (2013) who indicate positive perception of households has a better influence on the level of participation in forest management at Alamata forest in Tigray region of Ethiopia.

## 5. CONCLUSION AND RECOMMENDATION

### 5.1 Conclusions

In conclusion, the pre-conditions for participatory forest management, like common understanding on the problems of forest conservation and management, perceived community responsibility of forest management, users' conservation perception on forest changes, their livelihood activities' with their family size and the need to conserve forest resource management in the study area. Duration of residence is one of the variables that positive affecting on the likelihood of participation at 5%, significant level in participatory forest management. It is categorized under the broader factor length of living in year in the peasant association, social network of the peoples and structural relationship, trust by the people which may facilitate or impedes participation of farmers in PFM collectively.

Distance of the forest from the home had a negative impact on participation of protection of forest activities at 1% level of statistical significance; that satisfies prior expectation. The household far from the forest did not benefit from the forest because it requires additional cost for transportation of forest product from the area. They found a negative relationship between distances of a household's home from the forest and participation in forest management and protection practices due to information asymmetry and rare benefits obtained from the forest annual income obtained both from forest products sale and other livelihood diversification of their activity in the production year is used to measure the relative impact on participate behavior of forest users. However; as expected, total annual income of the household was found to have a very significant positive correlation with participation in participatory forest management activities. Moreover, households with better income may have better participate in participatory forest management with the assumption that people who are economically better-off can afford to make a fair contribution of time, labor and money towards community activities. Perception of household had a positive relationship and was statistically significant at 1% level in line with prior expectation.

The perception of farmers towards participation in PFM viewed from the angles of perceived benefits obtained from the forest, perceived extent of forest conservation and their effects, perceived current PFM approach, perceived rules and regulation and perceived responsibility of community in the area as a whole for sustainable management of forest in the area. Forest dependent had a positive effect and statistically significant at 10% level that satisfies the prior expectation. The highest number of livestock owner and households closer to the forest utilized feeds for their livestock either by sharing system or through payment. Most of the users of timber and non-timber forest products engaged in different livelihood activities such as beekeeping, cattle fattening, milk production and other livelihoods activities in individual and forest cooperative manner. The prevailing shortage of land was initiating farmers to diversify forest-based incomes through managing the forest in a sustainable manner. The results of the survey indicate 65.8% of sampled households were participating in participatory forest conservation and protection practices while the remaining 34.2% of sampled households were non-participants.

The result revealed that Distance of the forest from home is negatively related and decrease the likelihood of participation at less than 10% significance level and total annual income of the household was found to have a very significant negative correlation with participation in participatory forest management activities. On other hand, Duration of residence was positive affecting on the likelihood of participation at 5% significance level, perception of household was positively at less than 5% significance level, and benefit obtained or forest dependency are statistically significant at 10% level that satisfies the prior expectation, positively related and increase the probability of participation and Perception of household had a positive relationship and was statistically significant at 1% level in line with prior expectation. Therefore, we can conclude that household decision of participation is influenced by distance of the forest from home, Duration of residence, benefit derived or expected from the forest (forest dependency), and perception of the household and total annual income of the household. Finally, any intervention intended to enhance forest conservation and management through promoting collective institutions in the study area should take into account the most important variables identified by this study.



## 5.1 Recommendations

The study contributes to addressing constraints prevailed in the participation process of the communities in PFM practices. Therefore, based on findings of the study the following recommendations are given.

- The majority of household's perceived participation made for conservation practices is vital but there is considerable number of households who did not perceive towards participation made by farmers..
- Improving rural infrastructures such as road and transportation and timely providing information to encourage peoples participation on PFM activities in the study area
- The federal government, forest policies & strategies, rural land administration and land use policy & proclamations should be applied to reduce factors that hinder the goal of PFM practice in the area. Other concerns of different facilitator of PFM practice was about wise use of forest products, insuring equitable distribution among different social groups like gender and poor farmers in the study area to reduce factors affecting peoples participation in PFM..
- Inadequate emphasis on diversifying income sources and supporting forest-based activities to improving local people's livelihoods and reduce poverty through facilitate insurance and finance credit in the area.
- In addition to solving boundary conflicts, setting common rules and regulations at the forest ecosystem level, and making relevant decisions, monitoring and evaluating their implementations and create a sense of ownership for the farmers.
- Forest dependence has a great role on participation forest management activities. The direct benefits obtained from the forest are serving as incentives that help income diversification (e.g. introduce village-based, small-scale carpentry; honey processing and eco-tourism), value added products, and improved market linkages. At a landscape level, efforts must support the integration and complementarity of forest-based activities with other livelihood activities (e.g. with livestock production, apiculture, climate smart agriculture). Besides, options to maximize benefits of

communities from Payment for Ecological Services should be explored (e.g. from power generating and bottling companies, from drinking water supplying agencies, from tourism and recreational services providers increase participation more in protection forest activities).

- The local, regional, federal governments, NGOs, concerned organizations, environmental policy, political commitment and institutional arrangements are working together to use the forest wisely and sustainably to achieve the goal of PFM activities in the study area.
- Even though majority of users realized their collective negative effect and importance of community involvement in forest management, commencement of communicative collective institutions intervention should be done through creation of awareness on the problems and possible solutions. Moreover, encouraging discussions on alternative solutions, stressing on mutual benefits, negotiations regarding conflicting interests and finally make an agreement on future directions and actions should be major concerns of interventionists and collective action facilitators.

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## **7. APPENDICES**



## 7. APPENDICES

### Appendix Table 1. Household questionnaire

I am conducting a research proposal on Participatory forest management. The topic of my thesis is Determining Factors affecting farmer's participation of Participatory Forest Management (PFM) the Case Yayu coffee forest biodpher reserve Oromia , south west Ethiopia." Your information is very important for the study. So, I kindly request you to provide me with your answer.

#### PART I: General Information

1. Name of the district: \_\_\_\_\_ village/sub village: \_\_\_\_\_
2. Sex: Male \_\_\_\_\_ Female \_\_\_\_\_. Age \_\_\_\_\_
3. Number of people live/economically dependent in the household: \_\_\_\_\_
4. Distance from market in hours: \_\_\_\_\_
5. Distance from forest in hours: \_\_\_\_\_

#### PART II: Participation in PFM + understanding

1. Are you a member of the community forest management group?
  1. Yes 2 No
2. If no, why? \_\_\_\_\_
3. If yes, how long it takes from learning to the date CBO is formulated?
  1. Less than 2 years
  2. 3 – 3years
  3. Not yet formed
4. If your answer to the above question is not yet formed, why it takes long please specify  
\_\_\_\_\_  
\_\_\_\_\_

5. How were you involved in the identification of forest user group?  
\_\_\_\_\_

6. What are the major stages to formulate PFM?  
\_\_\_\_\_  
\_\_\_\_\_

Was that satisfactory: Yes/No comments \_\_\_\_\_

7. How were by-laws set?

8. Who made these decisions?

9. Was the community consulted about the by-laws? 1. Yes 2.No 3. No idea

10. Were you involved in decisions making? 1. Yes 2. No

PART III: Economic benefits and PFM

1. What are the positive benefits of PFM?

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2. What are the economic losses of PFM?

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3. Do you understand the aim of PFM project livelihood diversification programme? 1. Yes 2.

No

4. If yes what are they? Please fill the following table

NO	Livelihood diversification programme	Answer	
1	Seedling (nursery) production/sell		
2	Eco-tourism		
3	Growing app tree		
4	Beekeeping		
5	Hand craft		
6	Seed collection and sell		
7	Production and sell of bamboo		
8	Coffee drying bed		
9	Saving and credit		
10	Others		

5. Are you involved in any livelihood diversification activities? 1. Yes 2. No

6. If yes, what kind? \_\_\_\_\_. Where they good 1. Yes 2.No

PARTIV: Financial/ technical support

1. Have you received any financial/ technical support from PFM project in group and or individually?

1.Yes 2.No

2. If yes, for what purpose have you received the grant? \_\_\_\_\_.

3. Is there any follow up by PFM project organization or others (women's and children affairs office, cooperative? Environment forest and climatic change authority, forest enterprise office, agriculture and natural resource office) after you have received the grant? 1.Yes 2.No

4. If yes, how frequent has these organizations visited you to check progress of activity?

\_\_\_\_\_.

Was that enough? 1. Yes 2.No

PARTV: Household activities and their contribution to income

1. Main household activities and their contribution

No	Activity	Tike	Total income
1	Crop production		
2	Animal production		
3	Forest related activities		
4	Labor excluding on your own land		
5	Petty trade		
6	Remittance		
7	Others		

2. Annual income from forest products

Product	Time	units	Total income
Firewood			
Coffee			
Honey			
Fruit			
Grass			
Medicinal plant			
Other /specific			

3. Why you depend on forest? Please fill the following table

No	Why you depend on forest	Answer	
		Yes	No
1	No surplus produced to generate cash income		
2	Income from the other source is not enough to cover my expenditure		
3	It is just a trend of the society (culture)		
4	Sell of firewood is an additional source of income		
5	The product has high demand in the market		
6	Open forest resource access		
7	Others(specify)		

4. what are the advantage and disadvantage of participating and not participating of PFM

---

PARTVI: Services provided by the forest management group

1. What PFM information did you get from agricultural office of forest enterprise?

Type of assistance	Answer		How relevant is the training		
	Yes	No	1	2	3
Resource assessment					
Protection, development and utilization of forest resource					
Protection, development and utilization of forest resource					
Livelihood diversification					

Code: relevance: 1= not relevant, 2= quite relevant, 3= very relevant

PARTVII: Information related to transaction cost

1. How many times in a year is the forest management planning team meeting held? \_\_\_\_\_.
2. How much time do you devote throughout the year? \_\_\_\_\_.
3. How many times do you travel to district headquarter in context of forest management? \_\_\_\_\_.
4. How much is your investment in PFM so far? \_\_\_\_\_.

Thank you very much for time!

Appendix Table 2. Interview with project and yayu forest enterprise staff

1. What do you think very relevant in your staff to factors affecting farmer's participation in PFM?

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2. How do you rate the performance of your staff in Yayu and selected kebeles especially in performing these duties and responsibilities?

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3. Has this difference resulted in the participation of PFM in Yayu and selected kebeles? 1.

Yes 2. No

4. What has been the contribution of the traditional forest management system in yayu and selected kebeles which have almost the same sprit with PFM for the faster take-up of the project?\_\_\_\_\_

\_\_\_\_\_

5. Who are the stakeholders of the project (PFM) in Yayu and selected kebeles?

\_\_\_\_\_

\_\_\_\_\_

6. What are the roles of each stakeholder to reduce factors affecting farmers participation in each kebeles? Is there any difference?

\_\_\_\_\_

\_\_\_\_\_

7. Has this the contribution of stakeholders to participation of PFM in Yayu and selected kebeles 1 yes 2. No

8. Is there any difference in quality (in terms of providing livelihood support) of forest between the three kebeles? 1 Yes 2 No

9. If yes, what is the difference and impacts it has on the implementation of PFM?

\_\_\_\_\_

\_\_\_\_\_

10. Is there any difference between the three kebeles that affects PFM uptake due to near by Markets or towns? 1. Yes 2 No

11. If yes, has this contribute to the establishment of PFM to minimize the pressure of forest dependent in Yayu and selected kebeles ?

1 Yes 2 No

12. Has there any difference between the two districts in terms of expansion of agricultural land?

1. Yes 2. No

13. If yes, what are major factors that affect PFM practice in Yayu and selected kebeles?

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14. What livelihood diversification activities are implemented to reduce the pressure on the forest?

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15. Has there any difference in livelihood diversification activities performed in yayu and selected kebeles?

1. Yes 2. No

16. If yes, has this contributed to the relatively fast activities to change livelihood of the societies in Yayu and selected kebeles? 1. Yes 2. No

Explain how,

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17. Are there alternative income sources introduced to replace extraction of forest products?

1. Yes 2. No

If yes, please specify \_\_\_\_\_

18. What components are important to adopt PFM?

1. Economic benefit from the forest

2. Quality of forest

3. Economic status of the community

4. Other; please specify \_\_\_\_\_

19. What would you do differently if PFM programme was to be undertaken again?

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Thank you very much for your time!

## Annex C: Focus group discussion

### Focus group discussion

1. What has been done by PFM project to formulate cooperatives other than forest cooperatives to support livelihood of the community?-----

✓ Was that enough? -----

✓ And was the livelihood diversification programme performed so far successful?-----

-----

✓ What impacts it has on establishment of PFM?

2. Have you faced any problem in the past due to forest related policy or any other policy? Do you think that the problem will appear again if you adopt PFM? Have you thought it as a factor?

When adopting PFM?

3. Do you have a fear that PFM will restrict your use rights (such as firewood sells, honey Production timber etc) of forest? Why do you think this?

4. Any other suggestion about the forest management, management committee of the forest group and PFM in general?

Thank you very much for time!

Table4.1: Variance Inflation Factors (VIF) of the continuous explanatory variables

Variables	Co linearity Statistics	
	Tolerance (Rj <sup>2</sup> )	VIF (Xj)
AGE	0.549	1.822
FAMSIZE	0.839	1.112
EDUCHH	0.722	1.385
DURARESID	0.687	1.455
TOTALLAND	0.899	1.112
MARKDIS	0.633	1.580
DISSFRST	0.801	1.248
TOTAL LISTOCK	0.825	1.216
ANNI	0.740	1



Table 4.2: Contingency coefficients for discrete explanatory variables

	ATTITUDE	PERCE HH	SEX HH	FRSTDDP
ATTITUDE	1	0.184	0.381	0.34
PERCEP HH			0.77	0.049
SEX HH				0.130
FRSTDDP				1

Source: Own computation, 2019