Participatory Forest Management for Sustainable Livelihoods in the Bale Mountains, Southern Ethiopia

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Abstract

Preventing environmental degradation and alleviating poverty are the twin challenges of sustainable development. Participatory forest management (PFM) takes the challenge of preventing the degradation of forest resources while sustaining forest-based benefits to people's livelihoods. Yet, effective implementation of PFM requires a more profound understanding of the actual place of forest resources in the livelihoods of rural households and the role of forest-based activities in alleviating poverty.

This study is conducted in Southern Ethiopia in the Oromia region in the district of Dodola. It examines the context of a PFM initiated by the government in the 1990s. The main objectives of the study are to examine the role of the forest resource in the livelihoods of the local people and to describe the nature of forest use in order to understand the performance and perception of collective forest management. Data were collected through a series of household surveys and group discussions over a one year period supplemented by key informant interviews.

The results of the study show that forest products are important sources of income contributing to 34% and 53% of household per capita income and per capita cash income, respectively. Forest income is an important buffer against extreme poverty by filling seasonal gaps of income and by serving as safety net in times of income crisis. Forest income also provides the opportunity to diversify livelihoods, particularly for low income groups. Households' decisions on livelihood strategies including dependence on forest income are associated with socioeconomic and geographical factors. Furthermore, the performance of user groups and the attitudes and intention of households towards participating in collective management are associated with level of income and dependence on forest income. User groups that are more dependent on forest income and have higher heterogeneity in terms of dependence on the forest resource have shown lower performance. Forest dependent households have also shown a less favorable attitude and intention towards engaging in planting activities.

The study concludes that socioeconomic differences and the differentiated roles and values of forest products in the livelihoods of members of user groups are related to the success of participatory management and thus are important aspects to be considered in designing participatory forest management arrangements. It is recommended that a better outcome in terms of poverty alleviation can be achieved if pro-poor forest-based activities are specifically considered in planning conservation and development interventions.

Keywords: Forest income, Income diversification, Poverty, Collective action, Attitudes, Co-management

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Dedication

Dedicated to my late father Tesfaye Mekuria

Contents

List of Publications

This thesis is based on the work contained in the following papers, referred to by Roman numerals in the text:

I Tesfaye, Y., Roos, A., Campbell, B.M., Bohlin, F. (2010). Forest incomes and poverty alleviation under participatory forest management in the Bale Highlands, Southern Ethiopia. *International Forestry Review*, 12(1), 66-77.

II Tesfaye, Y., Roos, A., Campbell, B.M., Bohlin, F. (2011). Livelihood strategies and the role of forest income in participatory-managed forests of Dodola area in the Bale highlands, Southern Ethiopia. *Forest Policy and Economics*, 13, 258-265.

III Tesfaye, Y., Roos, A., Campbell, B.M., Bohlin, F. (2011). Factors associated with the success of user groups in a participatory forest management around Dodola forest in the Bale Mountains, Southern Ethiopia. *Journal of Development Studies* (in review, resubmitted).

IV Tesfaye, Y., & Roos, A. Attitudes of local people towards collective action for forest management: the case of participatory forest management in Dodola area in the Bale Mountains, Southern Ethiopia (manuscript).

Abbreviations

a.s.l.	Above sea level
CPR	Common Property/Pool Resources
CRSO-BARD	Council of the Regional State of Oromia, Bureau of Agriculture and Rural Development
CSA	Central Statistical Authority, Ethiopia
CSE	Conservation Strategy of Ethiopia
DFID	Department for International Development, UK
EEA	Ethiopian Economic Association
EFAP	Ethiopian Forest Action Program
EPA	Environmental Protection Authority
ETB	Ethiopian Birr
FAO	Food and Agriculture Organization, UN
FARM-Africa	Food and Agricultural Research Management, Africa
FODWA	Forest Dwellers Association
GDP	Gross Domestic Product
GFA	Gesellschaft für Agrarprojekte, M.B.H. Germany
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
IAD	Institutional Analysis and Development
IFMP	Integrated Forest Management Project
JICA	Japan International Cooperation Agency
MARD	Ministry of Agriculture and Rural Development, Ethiopia
MoFED	Ministry of Finance and Economic Development
NCS	National Conservation Strategy, Ethiopia
n. d.	No Date
NFPA	National Forest Priority Areas, Ethiopia
NGO	Non Governmental Organizations
ONRS	Oromia National Regional State
PA	Peasant Association

PASDEP	Plan for Accelerated and Sustained Development to End Poverty, Ethiopia
PBC	Perceived Behavioral Control
PFM	Participatory Forest Management
PFMP	Participatory Forest Management Project
PRA	Participatory Rural Appraisal
SLA	Sustainable Livelihood Approach
SLF	Sustainable Livelihood Framework
SNNP	Southern Nations, Nationalities, and People, Ethiopia
SDPRP	Sustainable Development and Poverty Reduction Program
TPB	Theory of Planned Behavior
WAJIB	Waldayaa Jiraatootaa Bosona, (acronym for forest dwellers association in the local language)
WBISPP	Woody Biomass Inventory and Strategic Planning Project
WCED	World Commission on Environment and Development

1 Introduction

1.1 Poverty and natural resources in developing countries

The concept of poverty encompasses material deprivation (in terms of income or consumption), low levels of achievements in education and health, vulnerability and exposure to risk, voicelessness, and powerlessness (Sen, 1999, World Bank, 2001). Accordingly, the poor are characterized by lack of income and assets to attain basic necessities, a sense of voicelessness and powerlessness in the institutions of state and society, and vulnerability to adverse shocks linked to an inability to cope with them (ibid). Three quarters of the poor people in developing countries live in rural areas (Sen, 1999, World Bank, 2007). Empirical observations in developing countries have shown that the rural poor are more dependent on natural resources to sustain their livelihoods than the non-poor (Beck and Ghosh, 2000, Cavendish, 2000, Jodha, 1986, Sen, 1999, Shackleton et al., 2008, Vedeld et al., 2007). As a result, poverty and natural resources management are considered to be parallel subjects in development and poverty reduction programs.

Discourses on poverty and natural resources management were revitalized since poverty was identified as a major cause and effect of environmental degradation in the Brundtland commission report (WCED, 1987). According to the report, poor people, pressured by the needs of survival, are forced to overuse environmental resources. The overuse of natural resources leads to environmental degradation which further impoverishes the poor completing the vicious cycle and leading to a downward spiral of poverty and environmental degradation. Another important outcome of the Brundtland report was the elaboration of the concept of sustainable development and the principles/strategies for achieving sustainable development – satisfaction of human needs/poverty alleviation, maintenance of ecological integrity, improved social organization, achieving equity and social justice (Gow, 1992,

Robinson and Redford, 2004). This configuration of poverty, environment and sustainability is considered an important watershed in development thinking (Gow, 1992).

The recognition of different dimensions of poverty (World Bank, 2001) combined with the new concept of sustainable development (WCED, 1987, FAO, 1989) further revitalized the issues of poverty alleviation and participation and empowerment of the poor and brought them to the forefront of development policies and programs (Agrawal and Redford, 2006). The downward spiral discourse of the Brundtland report on the poverty-environment nexus was challenged by many in the recent literature. There is currently, a growing consensus on the complexity of the poverty-environment nexus and on the importance of various processes and actors at different scales in mediating the relationship between people and environment. The downward-spiral argument has been criticized either for its disregard for the heterogeneity among the poor and their relationship to the environment or for encouraging macro-economic/top-down responses that may increase both environmental degradation and poverty (Dukaiappah, 1998, Fisher and Hirsch, 2008, Forsyth et al., 1998, Gray and Moseley, 2005, Scherr, 2000). To the contrary, reviews of many empirical studies have shown that poor people have a potential for adaptation and innovation that can be tapped to achieve environmental and poverty alleviation objectives (Fisher and Hirsch, 2008, Forsyth et al., 1998, Scherr, 2000, Shiferaw, 2006, Swinton and Quiroz, 2003). Others highlighted the importance of market failure and institutional factors in explaining the poverty-environment nexus (Dukaiappah, 1998).

This change in the understanding of the poverty-environment nexus is mainly a consequence of new thinking on poverty (multi-dimensionality, poverty as a process rather than a static phenomenon) and new thinking on the environment (variability in space and time, multiple perspective of the environment, use, and degradation, and pluralistic assessment of environmental changes)(Forsyth et al, 1998). For instance, in the context of rural areas in developing countries access to various assets (asset wealth) is more important than monetary wealth or income in describing poverty (Gray and Moseley, 2005). Assets in the form of physical resources, human capital, and social networks determine households' capacity to self-insure and manage risk in the face of calamity thereby influencing their vulnerability to shocks (World Bank, 2001). Households' decisions to become involved in production activities and investment in enhancing the natural resource base also depend on the types and amount of assets they possess (Reardon and Vosti, 1995). Therefore, a focus on livelihood security and assets is suggested to enhance the achievement of the

dual objectives of environmental sustainability and poverty alleviation (Arnold and Bird, 1999, Gow, 1992).

In general, it is understood on the one hand that the poor are more dependent on natural resources and also more vulnerable to the impacts of environmental degradation. On the other hand, the relationship of the poor to their environment is not to be described singularly as a vicious downward spiral of degradation but rather as a complex one mediated by contextual factors such as socioeconomic institutions. Moreover, poor people are not a homogeneous category but include different groups of people with varying dependence on and access to different environmental resources and varying degrees of vulnerability to environmental shocks and stresses.

1.2 Livelihoods and natural resources management in Ethiopia

1.2.1 Land use, deforestation and land degradation

Ethiopia is a landlocked country situated in the Horn of Africa. It is one of the most populous countries in Africa with 79.5 million people of whom 84% reside in rural areas (CSA, 2009). Agriculture is the major economic activity accounting for 47% of GDP and 85% of employment (CSA, 2008, MARD, 2009). Farm activity is characterized by smallholding subsistence-based production where 48% of the farming population own landholdings less than the minimum area required to meet the minimum food requirement (EEA, 2002). The headcount poverty ratio in 2010 was 44.5% (ADI, 2010). The highlands between 1500m and 2500m a.s.l. constitute around 43% of the total area of the country (World Bank, 2004). The highlands also contain about 85% of the population, 95% of the cultivated land and 80% of the cattle population (ibid). The suitability and potential productivity of the highlands of Ethiopia have made them attractive for settlement for a long period of time and there was thus heavy conversion of the natural vegetation to agricultural uses (Place et al., 2006). Such a high concentration of population together with unmatched population growth and stagnating agricultural productivity made natural resources degradation an important development issue in the highlands of Ethiopia (ibid).

It is evident that most of the highland forests have been heavily converted to other land uses (Bishaw, 2001, Darbyshire et al., 2003, Dessie and Christiansson, 2008, Eshetu and Hogbeg, 2000, Teketay, 2001). The most reliable estimate of forest cover, based on thorough field inventory by the Woody Biomass Inventory and Strategic Planning Project (WBISPP), is 4.07 million hectares which is about 3.56% of the total area of the country (WBISPP, 2000). The estimate does not include woodlands and shrublands –

categorized as non-forests - which cover an area of 29.2 million ha (25.5%) and 26.4 million ha (23.1%), respectively. Based on WBISPP's assessment, some 95% of the existing forest is located in three regions – the Oromia, Southern Nations, Nationalities and People (SNNP), and Gambela regions which constitute 43% of the land area of the country. The Oromia region takes the largest share with 63% of the total forest cover located in this region. According to WBISPP's assessment, land clearing for agricultural expansion is a major cause of deforestation – 59,000 ha per annum in the three regions only – Oromia, Southern Nations, Nationalities and People (SNNP), and Gambela regions.

Land degradation in the form of general loss of productivity is a pervasive problem in the tropical highlands and Ethiopia is no exception (Nyssen et al., 2009). Particularly, cultivation and overgrazing of fragile steep mountain slopes for a long time resulted in extreme land degradation through soil erosion (Hurni, 1988, Tekle, 1999). The annual loss of topsoil from the highlands of Ethiopia was estimated to be over 1.5 billion tons which is equivalent to losing 1–1.5 million tons of grain (Tadesse, 2001).In some of the most productive highlands, land degradation in the form of soil erosion is becoming a great problem threatening a serious loss of agricultural potential at a fast rate (Zeleke and Hurni, 2001). Lemenih et al. (2005) and Solomon et al. (2002) reported a significant loss of the fertility of topsoil as a result of deforestation and subsequent cultivation of highland forests. Deforestation and overgrazing, as consequence of fast population growth unmatched by growth in agricultural productivity, are widely agreed to be the immediate or direct causes of land degradation in Ethiopia (Bojö and Segnestam, 2000, Bishaw, 2001, Dubale, 2001, Grepperud, 1996, Teketay, 2001, Zeleke and Hurni, 2001). However, overlapping and conflicting tenure institutions and conflicting interests between local community and state (Bekele, 2003, Stellmacher, 2007), socio-political and economic factors leading to changes in land tenure and immigration, and increased access to markets (Dessie and Christiansson, 2008) also underlie the expansion of the agricultural frontier and decline of forest resources in the country.

Starting in the 1970s, the problems of deforestation and land degradation have become a national agenda and massive counteractive measures were taken to avert the process (Hurni, 1988, Tekle, 1999). As the process of land degradation is associated with reduced crop productivity and greater vulnerability to famine, it has been linked to the problem of poverty (Dubale, 2001, Hurni, 1988). In an agricultural productivity optimization model, Sonneveled and Keyzer (2003) predicted that without soil erosion control, the future agricultural production will stagnate, resulting in distressing food

shortages and a dramatic reduction in rural incomes below the poverty level. The conservation strategy of Ethiopia also recognized that an unchecked process of natural resources degradation can cause a serious impairment of the environment's ability to maintain the population even at the existing level of poverty (NCS, 1994b). Deforestation and soil degradation are also identified as the major causes of food insecurity and poverty in the current five-year development plan of the country (PASDEP, 2006).

In summary, the country has an agrarian economy with the majority of the population residing in rural areas, concentrated in the highlands, and employed in low productive agricultural production. The need to provide for an increasing population combined with other social, economic and political factors has resulted in an ever increasing expansion of the agricultural frontier and hence, subsequent deforestation and land degradation. There is a growing understanding that this process will further exacerbate poverty, which brings natural resource conservation to the forefront of rural development initiatives.

1.2.2 Forest resources and rural livelihoods

Four agricultural systems can be distinguished in Ethiopia (Westphal, 1975): the seed-farming complex, the enset-planting complex, shifting cultivation, and the pastoral complex. The seed-farming system is also identified as a mixed crops-livestock complex (Getahun, 1978) or cereal farming systems (WBISPP, 2000) whereas the enset-planting complex is identified as a horticultural-livestock complex (Getahun, 1978) or enset-root farming systems (WBISPP, 2000). The agricultural land use systems (WBISPP, 2000) or mixed agricultural systems (according to Getahun, 1978) include about 90% of the total rural population whereas the remaining 10% of the rural population are pastoralists (Dercon et al., 2005). About 32% of the agricultural land use system is enset-root farming systems (ibid). The type of crop cultivated is the main distinguishing features of these two systems with enset and root crops being staples or co-staples in the enset-root systems whereas cereal, pulses and oil crops characterize the cereal farming systems.

According to the WBISPP assessment (WBISPP, 2000), woody biomass mainly firewood is the main source of energy in rural Ethiopia. It is also supplied to markets by some households to generate cash income. However, for most of the farming systems in the highlands there is a low level of integration between the agricultural (crop and livestock) production and tree management. Wood products are generally scarce and forest management is lacking except for limited tree planting activities in homesteads and trees on farms in some highland areas. Thus use of crop residue and dung for household

energy purposes is very common. The dependence on fuelwood will persist for the foreseeable future (Bekele, 2001).

Many sources point out the lack of reliable information about the role of forestry and its contribution both to people's livelihoods and in the macro-economy. The Ethiopian forestry action program document (EFAP, 1994) is the most recent and quoted source in this regard. Although the environmental services of forest resources are well acknowledged, the multi-faceted benefits of forest resources to rural livelihoods for subsistence uses and as a source of cash income are not widely reported in the literature. However, considering the agrarian base of rural households' economy, the dominantly traditional farming methods and their dependence on natural resources, it can be expected that forest products have a significant role in rural livelihoods (FAO, 2004). Case studies in Northern Ethiopia (Babulo et al., 2008) and Central Ethiopia (Mamo et al., 2007) show that rural households around forests obtain diverse forest products and earn a considerable part of their income (29% & 39%, respectively) from their use of forest resources. However, the overall economic and employment contributions of the forestry sector are not yet fully accounted for (Bekele, 2001). Thus the existing national estimate considers mainly the forest industry, reforestation and afforestation activities, and incense and gum production which are mainly government run or commercial productions (ibid). The 2009 estimate of the contribution of forestry to the GDP of the country is 3.4%.The country's development plan also highlights the importance of conservation and management of forest resources for rural livelihoods by way of improved environmental rehabilitation and utilization without explicit reference to contribution to rural income and food security or poverty alleviation (PASDEP, 2006).

1.2.3 Forest management and policies

Almost all the natural forests in Ethiopia were designated state forests until the development of the Forest Development, Conservation and Utilization Proclamation number 542/2007 in the year 2007 which made provisions for the ownership of natural forests by local communities. However, access to state forests is still highly restricted including keeping bee-hives on trees (Proclamation no 542/2007). In the past few decades, the context for forest resource management has featured conflicting interests between the government and local people, weak enforcement of forest property rights, inadequate resources and inefficient approaches for protection, and a lack of sufficient incentive for local people to manage forests (Bekele, 2003). Forest decline has been an eminent phenomenon in Ethiopia, and endangered

indigenous tree species in state forests are thus banned from any kind of logging.

The historical development of institutions for forest resource management was marked by a total disregard of sustainable use of the resource during the monarchial period (before 1974) and a very protective and exclusionary state control of the resources (between 1974 and 1991) that resulted in persistent conflicting interests between the state and local people (Bekele, 2003). The lack of a strong enforcement of forest rules and regulations and the occasional political power vacuums during times of government transition precipitated de facto a situation of open access and spells of severe deforestation (ibid). According to Poschen (1987), prior to 1974, forestry, as land use in general, had not been a major government concern. The main involvement of the forest development and conservation department was limited to running nurseries and supplying seedlings to peri-urban plantations and issuing forest product marketing licenses (Bendz, 1988). About 75% of the forest areas were estimated to be private forests (ibid). Forestry activities were predominantly natural forest exploitation and establishment of fuelwood plantations in peri-urban areas (Poschen, 1987). When the socialist government took power in 1974, agricultural and forest policies changed drastically. The major changes were the abolishment of the feudal system of land tenure and the creation of Peasant Associations (PAs) to reach and organize the rural population. Government-initiated reforestation and afforestation activity increased rapidly after 1975 (ibid).

In the 1980s, management of forest resources in Ethiopia was mainly carried out as community forestry programs and state forest programs (Mengistu, 1994). The three main activities of the community forestry programs were nursery activities, community woodlots, and hillside plantations (ibid). The whole concept of community forestry was based on campaign-like activities that were deficient in providing incentives to the local people (Bendz, 1988). Admassie (2000) highlighted the top-down approach that characterized these community forestry programs and their failure to consider local people's traditional access to grazing areas and to guarantee associated benefits from plantations. The state program involved a strategy that identified 58 National Forest Priority Areas (NFPAs) spread all over the country (Mengistu, 2002). The stated objective of NFPAs was "to protect and develop the remaining natural forests, allocate available resources on these areas and introduce integrated forest management, with an ultimate goal that each NFPA becomes a self financing enterprise" (ibid). Most of these NFPAs were not gazetted and the forestry services at the national and regional level lacked clear legal titles to these areas. Hence an open access situation has prevailed leading to

encroachment (ibid). Following the decentralization of the state administration in the current regime, all forests are managed and administered by regions and the federal department is responsible for policy and strategy development (Bekele, 2001).

1.2.4 Participatory forest management (PFM) in Ethiopia

Participation is a difficult term to define since it has been historically applied in different contexts that bear up on its current meaning (Nelson and Wright, 1995). Furthermore, the definition of the term can be far from its actual application in practice owing to ideological connotations or meanings given by people situated differently (ibid). There are three main ways in which the term participation is used – as a cosmetic label (to keep up appearances), as a co-opting practice (to mobilize labor and reduce costs), and as an empowering process (Chambers, 1995). Nevertheless, it is evident that there is a major shift for various reasons among development practitioners from "things to people" (Chambers, 1995) such as: recognition of the failures of top-down approaches, concern for cost-effectiveness, preoccupation with sustainability, the insight that involvement will increase incentives for commitment, and the ideological belief that poor people should be empowered. The predominant concern of participatory development will therefore dictate the positions of the participants (Nelson and Wright, 1995). Cohen and Uphoff (1980) identify four forms of participation in a rural development context: participation in decision making, implementation, benefit and evaluation.

The World Bank (1996) defined participation as "a process through which stakeholders influence and share control over development initiatives and the decisions and resources which affect them." According to Nelson and Wright (1995), this definition was intended to exclude situations in which primary stakeholders are involved simply as passive recipients, informants or laborers in a development effort. It gave priority to getting communities to decide on their own priorities (transformative) rather than getting people to buy into a project (instrumental) (ibid). However, the prevailing practice of participation in most project contexts is criticized for emphasizing instrumentality and an excessive focus on techniques while failing to adequately address issues of power and control of information (Cleaver, 1999). In this regard, Khotari (2001) explains the failure of the commonly applied participatory rural appraisal (PRA) techniques to disclose and dislodge those forms of control and dominance that cannot be simply articulated in the direct and immediate relationship between participant and observer.

In Ethiopia, the involvement of local people in natural resource management activities can be traced back to the countrywide massive programs for natural resource conservation and rehabilitation that were initiated as a reaction to the 1972/73 famine (Admassie, 2000). According to Admassie (2000), communities' involvement in these programs, sometimes also referred as participation, is understood to be a contribution of labor and resources that often is arranged together with food for work payments. Particularly, the involvement of people in soil and water conservation and afforestation programs was a top-down and coercive process. Thus the efforts were not complemented with the necessary commitment and enthusiasm from the local people and were even met with resistance that ended with little outcome to show for the enormous investments made (ibid). Admassie (2000) indicated both the lack of appropriate local level institutions and the ineffective mode of the participation process that failed to implement successful community based natural resource management. Local level organizations (Peasant Associations), despite their mandate to organize collective action and manage common goods, had no prior experience in natural resource management (common property management) and they were discredited in the eyes of their members due to their association with the regime, where they served as instruments of unpopular rural programs. Owing to the large area under the PA's jurisdiction, there was a low level of shared sense of community that resulted in less effective collective action (ibid).

Management of natural forests has been the task of the state, particularly following their designation as state forests by the 1975 proclamation that nationalized rural lands and forest resources. Following this nationalization, local people were legally prohibited from access to the traditional benefits they used to get from state forests. However, the enforcement of the state ownership was weak and inefficient (Bekele, 2003). The 1980 forest and wildlife conservation and development proclamation (Proclamation no. 192/1980) defined most of the natural forests as state forests. A government order further identified all forest areas above 80 hectare as state forests, although this was not recognized by local administrations as it was not issued as a legal regulation (Bendz, 1988). This has created uncertainty about ownership in most forest areas (ibid). The traditional or customary rights to forest use by local people therefore still loom large in real practice, creating a de facto legal pluralism and strengthening an open access situation with no or limited incentives for the sustainable use and management of forest resources (Bendz, 1988, Stellmacher, 2007). The situation typically portrayed Fitzpatrick's (2006) description of the conditions for the evolution of an open access situation in third world countries – the presence of heterogeneous claimants;

high stakes in terms of livelihood security; a certain amount of state incapacity or illegitimacy; some degradation in local norm-based systems; and a degree of antagonism and overlap between legal and norm-based property arrangements. This situation combined with the pressing need of local people for forest products and land for crop production and grazing precipitates an ever shrinking forest area and environmental degradation.

Participatory management of natural resources has become a major subject of policy debates in Ethiopia in the recent past on a par with food security and rehabilitation of natural resources (Keeley and Scoones, 2000). The participatory agenda was revived following the extensive destruction of conservation structures and deforestation activities during the change of government in the early 1990s. These incidents were conceived as manifestations of public discontent and the failure of the heavy-handed, top-down, and campaign style approaches to natural resources management (ibid). As a result, discourses on the need to understand rural livelihoods, local contexts, and the need for consensual involvement of the community in development and conservation activities began to gain ground in the policy debate (ibid). Concurrently, the National Conservation Strategy (NCS, 1994b) of Ethiopia widely acknowledged the need to integrate development with environmental protection and the importance of the participation of local population. The conservation strategy adopted a decentralized approach in developing the strategies that facilitated the consideration of ecological diversity and the integration of institutional and stakeholders' conflicts in the use and management of natural resources (Wood, 1993). As stated in the NCS, "If a conservation project is to be really participatory, the community has to feel, at least as much as the planning expert, that it has decided that conservation is its priority problem, and that it wants to undertake specified conservation measures, e.g. planting trees." In addition, two important aspects of participation are emphasized in the NCS: 1) it stresses an equal share of power in decision-making between local people and the government (experts) and, 2) the need to define the participating stakeholders based on their perception or view of forests as resources. Further, the decentralization processes started by the current government and the increasing emphasis on participation in the international development literature also have their impact in strengthening the participatory agenda (Keeley and Scoones, 2000). As a result, participatory approaches proliferated in many development activities in the country- in land use planning, agricultural extension and training (Participatory Agricultural Demonstration and Extension Training System) and in conservation and sustainable management of natural resources (Harrison, 2002).

SOS Sahel and FARM-Africa are the NGOs that pioneered the current participatory natural resource and forest management initiatives in Ethiopia. Participatory forest management (PFM) was used as an umbrella term to refer to the various systems that have been developed in different countries including community forest management, collaborative forest management, and joint forest management (Anders, 2000). Initiatives were also supported by other development agencies and NGOs including German Society for Technical Cooperation (GTZ) and Japan International Cooperation Agency (JICA). PFM projects have the overall objective of promoting sustainable management and conservation of forest ecosystems and improving the livelihoods of people living in or around these resources (IFMP, 1999, IFMP, 2002, JICA, 2006, PFMP, 2006). The guideline developed by FARM-Africa describes the main principle of PFM as partnership based on shared goals and beliefs and a common understanding between the local community (user groups) and the government concerning the need for sustainable use, joint management and the requirements of the participatory arrangement (Anders, 2000). The PFM projects invariably share the idea of forest-dependent rural households and recognize the conflict between livelihood activities and the objectives of conservation. They also accept the moral and practical need to reconcile the two by integrating development and conservation activities (Anders, 2000, IFMP, 1999, JICA, 2003, PFMP, 2006). There was a strong optimism about the projects as promising initiatives to promote community participation in the management of forest resources in line with the conservation strategy of the country (EPA, 2003). Currently, the Ministry of Agriculture and Rural Development is planning to scale up PFM projects in different parts of the country (Winberg, 2010).

2 Problem statement and purpose

The poverty reduction strategy paper (PASDEP, 2006) states that "reversing environmental degradation and poverty eradication are mutually reinforcing imperatives and have to be implemented together in Ethiopia's development initiatives." In fact, many efforts have been made towards poverty reduction and environmental rehabilitation in the past and the tremendous resources expended though the outcomes have been minimal and not adequate to avert the trend. Moreover, the empowerment and participation of local people in decision making on the management of resources important to their livelihoods represents one of the guiding principles of the sustainable development strategy of Ethiopia (NCS, 1994a). The strategy advocates participation on the premise that sustainable use and management of natural resources require a change in attitude and thinking that can only be achieved through conviction and internal motivation (NCS, 1994b). However, the link between poverty and natural resource degradation has been an influential but a contested issue. Besides, any effort to mitigate degradation of natural resources and alleviate poverty should be based on systematic analysis of the livelihoods of the rural poor and their interaction with the environment.

As the most persistent and prevailing word in the development language (Chambers, 1995), participation is understood and employed in various ways – swinging between the efficiency (instrumentalism) views to the people empowerment views of participation (Cleaver, 1999, Nelson and Wright, 1995). Whereas the former view understands participation as a means to accomplish a certain goal in a more efficient, effective or cheap way, the latter takes participation as an end in itself whereby communities set up a process to control their own development (Nelson and Wright, 1995). However, the notion of 'community' in community-based natural resources management has been the key and also the most criticized aspect of most participatory approaches (Agrawal and Gibson, 1999, Cleaver, 2000, Leach et al., 1999). In

most cases a unified, homogeneous and organic community with locally evolved rules and norms for equitable and sustainable management of resources is visualized. On the other hand, it is argued that social identities such as gender, caste, wealth, age, and origins divide and crosscut so-called community boundaries and thus, cannot be overlooked (Leach et al., 1999). According to Cleaver (1999), 'community' may be used as a definition of exclusion as well as inclusion depending on the rights, activities, or benefits implied in the notion of community (Cleaver, 1999). Important differences in interests among actors within communities including the relevance to collective resource management of a spatially or administratively delineated community must therefore be critically considered (Agrawal and Gibson, 1999; Leach et al., 1999). Consequently, perspectives that view differentiated social actors, the diverse components of the environment valued by different groups, and the differentiated access to and control over such resources is necessary (Agrawal and Gibson, 1999; Leach et al., 1999)

Participatory management approaches in Ethiopia are basically modeled on providing incentives to local communities in terms of use rights or benefits. Local communities (user groups) will in return take collective responsibilities for the sustainable management of the resource by signing contracts with the government (Anders, 2000, Kubsa et al., 2003, ORL&NRAA, 2004). However, the understanding and implementation of participation can also vary among the different types of activities and agents involved in the partnership (Harrison, 2002). For instance, households may understand participation as involvement in collective activities to benefit their community whereas development agents consider it as consultation with local people in planning development activities. In this regard, Popp (2005) described the PFM approach at Dodola forest as influenced by the development narrative of continuous degradation of natural resources while overlooking local traditional uses and giving priority to conservation over the participation of local groups. The author claimed that the participatory agenda was set externally in a top-down way which mainly attempted to reverse a presumed 'open access' situation (ibid).

Considering the widely held belief about the threat of deforestation and land degradation in Ethiopia and also in view of the sequence of interventionist activities undertaken to curb the situation, it is safe to assume that the views of the other main actors, the rural community, have been underrated or at least that they merit further study. The participatory development discourse is still dominated by the traditional view of farming, mainly crop and livestock production, as the mainstay of rural communities without due regard to the role of environmental resources in people's livelihoods. Forest resources are valued

only for the supply of household energy while other roles in the livelihoods of rural households are not fully appreciated. Besides, the differentiated roles of forest products in the livelihoods of rural households are not fully appreciated. Income from forest resources are not properly valued and are usually lumped in a non-farm income category (SDPRP, 2002). However, the importance of forest resources in the income portfolio and their role in the livelihood strategies of rural livelihoods have been indicated in some small scale local studies (Dercon and Krishnan, 1996, Mamo et al., 2007, Tefera et al., 2004). The description of major farming systems in the country does not portray links with the natural resource component, particularly forest resources, despite the major role of forests as energy sources. The frequent famines and the urgency of food security have obviously impinged on development policies and programs resulting in agriculture-focused development activities in the rural areas. Although there is recognition of the link between decline in land productivity and use of crop residue and dung as substitute for firewood, other roles of environmental resources are undervalued.

As indicated in Harrison (2002) and in view of the aforementioned conditions, there is a real opportunity to enhance the effectiveness of participatory approaches in the country with a better understanding of the actual context. Moreover, the complexity of the poverty-environment relationship implies that participatory arrangements will benefit from the knowledge of the multiple roles and values of environmental resources and the equally differentiated interests of local communities. The design of institutions and arrangements for collective action can be effectively tailored if it is cognizant of and sensitive to such particularities of the local context. It is also of both academic and developmental interest to understand the link between forest management and poverty, to identify the best institutional design and approach to involve local people in forest management, to identify the most efficient incentive that can win the commitment of local people on a sustained basis, and to put right the livelihood improvement and conservation goals in forest management.

The purpose of this study is to provide empirically supported information that can contribute to a better understanding of the socioeconomic environment for participatory management and enhance the formation of effective institutional arrangements towards achieving successful participatory management. The study is undertaken against the backdrop of a participatory forest management that was initiated from the outside. Similar to other government-initiated, community-based natural resource management activities, the organization and identification of the community was heavily influenced from the outside. The same is true for the goals and objectives of

the participatory management. The study therefore attempts to zoom in on and describe the salient features of the actual implementation of the PFM and the perspective of the local people involved in the arrangement. It elucidates the patterns of forest use, the place of forest production in the livelihood strategy of rural households, the differentiation of dependence on the forest and income among households, and the function of forest income in households risk management strategy and poverty alleviation. In view of the pervasiveness of deforestation and land degradation in the highlands of Ethiopia, that are inhabited by 85% of the population and account for 95% of crop production, the study will provide a real perspective of and insight into integrating forest resources in development and conservation policies and strategies in the context of an agrarian economy.

3 Objectives and research questions

3.1 General Objective

In the context of a participatory forest management arrangement initiated by a government, the study aims at investigating and describing the nature of forest use by local people, the importance of forest-based benefits to livelihoods, and evaluates this from the perspective of impacts on people's livelihoods, performance of collective management and local people's perception of participating in a collective forest management activity. It also intends to point out the implications of the findings for designing future participatory forest management schemes and the implications of the findings for incorporating poverty alleviation objectives in conservation and development projects.

3.2 Specific Objectives

The specific objectives of the study are, in the context of a participatory forest management in the Bale highlands of southern Ethiopia:

1. To evaluate and explain the contribution of forest resources and role of forest income in the livelihoods of local households and poverty reduction
   - How large is the contribution of forests to the rural livelihood in the study area and what are the most important forest products?
   - Are there patterns and seasonal variations in forest use, forest dependence and forest product preferences among income groups?
   - Are socioeconomic characteristics of households important in explaining such patterns?
2. To identify and describe the livelihood strategies of households, household assets, livelihood diversification, livelihoods outcomes, and the role of forest income in different livelihood strategies.

- What are the main types of livelihood strategies and attributes of households that adopt different livelihood strategies?
- How do the different livelihood strategies compare in terms of livelihood outcomes?
- What is the role of forest resources and forest income in the different livelihood strategies?

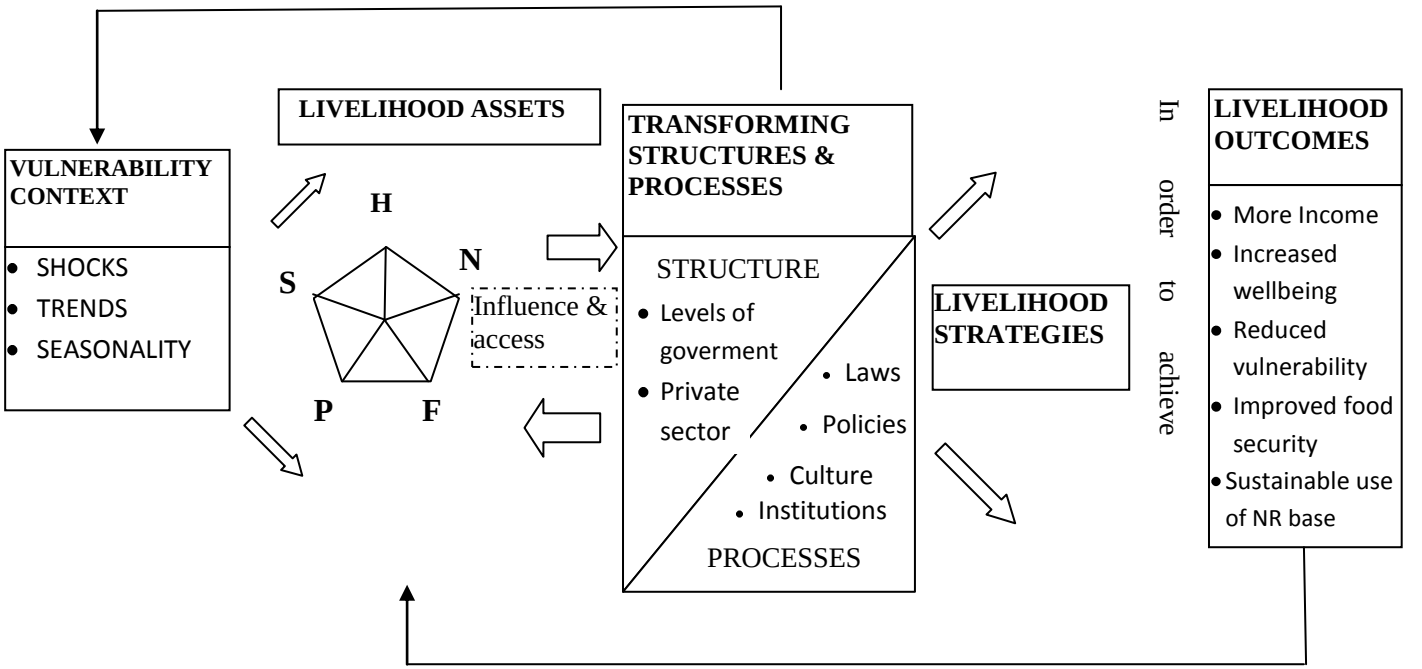
3. To identify the most important contextual factors that are associated with performance of collective action and thus, to assess the potential of PFM in achieving conservation and development objectives
   - Are user group attributes and forest resource characteristics important in explaining the performance of user groups in the Dodola forest PFM?
   - Which specific contextual factors are associated with user group's performance of collective action?
4. To evaluate people's attitudes towards the participatory management and describe the beliefs that underlie the intention of local people to participate in collective action with particular reference to tree planting.
   - What is the attitude of households towards participation in the collective management activities?
   - What explains differences among households in attitudes towards participation in collective management activities?

4 Literature review and theoretical framework

4.1 Sustainable livelihoods

The concept of sustainable development brought a new configuration of environment, poverty and sustainability (Gow, 1992). It is believed that sustainable development requires increasing the capacity of rural people to influence and control their future on a long-term basis, a goal that can be achieved by strengthening capacity, supporting equity, and fostering empowerment (ibid). There was a growing understanding that alleviating poverty is more than a production problem; that rural employment is characterized by multifarious activities (diversification), and deprivation and wellbeing have multiple dimensions (Chambers and Conway, 1992). This implied that the conventional approaches aimed at increasing employment, incomes and productivity in single occupations such as farming may be missing their targets (Ellis, 2000b). Sustainable livelihood was thus taken as an integrating concept for a new framework or paradigm for development thinking (ibid). A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living (Conway and Chambers, 1992). A livelihood is sustainable when it can cope with and recover from stresses and shocks, maintain or enhance its capabilities and assets, while not undermining the natural resource base (ibid). The widely appreciated feature of livelihoods thinking and approach is that it directs attention to a holistic approach, to the multiple forces and influences on people's livelihoods, to the assets and access to assets, and to the options people possess in practice to pursue alternative activities (Dorward et al., 2003, Ellis, 2000b). Since the introduction of the livelihood concept, it has been re-defined and modified by different scholars and development agents to adapt it and apply it to their own needs and circumstances (Carney, 2003, Hussein,

2002, Krantz, 2001). The department for international development (DFID) of the UK (DFID, 1999) developed a widely used framework for livelihood analysis (Figure 1).



H = human capital, **N**= natural capital, **F**=financial capital, **P** = physical capital, **S**=social capital

Figure 1. The sustainable livelihoods framework (DFID, 1999)

The vulnerability context refers to those aspects of the external environment that influence livelihoods and over which people have limited or no control (DFID, 1999). These aspects of the external environment have a direct impact on the asset status of people and the options open to them to pursue a beneficial livelihood (ibid). Five types of livelihood assets (capitals) are recognized: natural, physical, human, financial, and social capital. This categorization is assumed to be a settlement for the various lists of assets identified by different researchers (Ellis, 2000). Natural capital refers to environmental resources such as land, water, and biological resources whereas physical capital stands for those assets created by production processes such as buildings, roads, farm equipment, tools and irrigation canals (Ellis, 2000). Human capital refers to labor together with its education level, skill and health (Carney, 1998). Financial capital measures the availability of cash or the equivalent that enables people to adopt different livelihood strategies (DFID, 1999). It can be in the form of savings, loans or other transfers (ibid). Social capital refers to the social resources upon which people draw in (e.g. social networks, membership in formal and informal groups, and participation in relationships of trust, reciprocity and exchanges) (DFID, 1999). The transforming structures and processes include the institutions, policies, and organizations that determine access to assets, returns to livelihoods strategies, and terms of exchange between different types of capital (DFID, 1999). Ellis (2000) considered them as critical mediating factors that inhibit or facilitate households' exercise of capabilities and choices. They are distinct from the vulnerability context as they are predominantly endogenous to the social norms and structures of which households are a part (ibid).

The interplay of the vulnerability context, livelihoods assets, institutions and organizations influences the adoption of particular livelihood strategies and livelihood outcomes. In the DFID framework (DFID 1999) livelihood strategies denote the range and combination of activities and choices that people make/undertake in order to achieve their livelihood goals. They include productive activities, investment strategies, reproductive choices and others (ibid). The adoption of livelihood strategies is a dynamic process in which households combine activities to meet their various needs at different times (Ellis, 2000). Scoones (1998) identified three broad clusters of livelihood strategies: agriculture-based strategies, diversified strategies, and migration-based strategies. On the other hand, Ellis (2000) identified two broad categories: natural resource-based activities such as collecting or gathering, crop/food cultivation, livestock keeping/pastoralism, brick making, weaving, thatching etc; and non-natural resource-based activities such as trade and services. However, livelihoods diversification is a fundamental feature of

livelihood strategies particularly among rural households (Bryceson, 1999, Ellis, 1998). Livelihood diversification decisions are influenced by vulnerability contexts such as seasonality and shocks, ownership and access to assets, and factors related to transforming structures and processes including macro-economic policies (e.g. structural adjustment programs) and market failures (Barrett et al., 2001, Bryceson, 1996, Bryceson, 1999, Ellis, 2000a, Reardon et al., 1992).

The achievement or outputs of livelihood strategies are livelihood outcomes (DFID, 1999). According to Scoones (1998), establishing livelihood outcome indicators is equivalent to elaborating what a sustainable livelihood means. Accordingly, five important elements of sustainable livelihoods outcomes are implied: gainful employment, poverty reduction, wellbeing/capability, adaptation and resilience, and sustainability of the natural resource base. Therefore, a sustainable livelihood should provide an employment that enables gaining income, consumable output, and recognition for being engaged in something worthwhile. The livelihood outcomes, particularly the wellbeing dimension including self-esteem, security, happiness, stress, vulnerability, power and exclusion should be assessed as perceived by people themselves (DFID, 1999, Scoones, 1998). The ability of a livelihood to cope with and recover from stresses and shocks is also a central aspect of sustainable livelihoods (Scoones, 1998).

The common attribute of livelihood-based approaches is that they regard the asset status of the poor as fundamental to understanding the options open to them, the strategies they adopt for survival, and their vulnerability to adverse trends and events (Ellis, 2000). Therefore, the livelihood approach has offered a positive perspective of development as it recognizes the variety of resources, capacities, and entitlements accessed by poor people and seeks to build on them (Small, 2007). It embodies no prior requirement for the poor rural individual to be a small farmer unlike earlier rural development approaches (Ellis and Biggs, 2001).

Since its development, the sustainable livelihood framework has become an analytical framework or an approach to planning development projects and programs (Baumann and Sinha, 2001, Farrington, 2001). At the conceptual level of a framework, the broad working parts and their posited relationships that are used in an approach to a set of questions (in this case sustainable livelihoods) are identified to help organize diagnostic and prescriptive inquiry (Ostrom et al., 1994). In a similar fashion, the sustainable livelihoods framework is intended to draw attention to important components, core influences and processes pertaining to people's livelihoods and to emphasize the multiple interactions between them (DFID, 1999). The sustainable

livelihoods approach helps the analyst to generate questions focused on the ability of people to support themselves with a view of the entire context of their livelihoods – both physical and social environments, and at the local to the global level (Castro, 2002). Therefore, a livelihood-based assessment of the impact of an intervention will consider current livelihood strategies of people, their achievement and priorities, how these are influenced by the intervention, and differences between different groups with regard to such impacts (Ashley and Hussein, 2000). Based on this understanding positive and negative livelihood impacts and the underlying motives of participation or reaction of different groups of people can be identified (ibid).

The main shortcoming of the sustainable livelihoods (SL) framework is its complexity both as an analytic tool and development approach owing to the huge amount of data required and the challenge of incompatibility with the often sectoral development approach practiced in reality (DFID, 1999). The other critique is related to the lack of specific conceptualization of the roles of market and technology (Dorward et al, 2003) and social structure and power relations such as, class, gender, and ethnicity in the SL framework (Small, 2007). The SL framework, being mainly influenced by microeconomic and development concepts while not formally linked to any one theory of social or economic change, could sometimes lead to interventions in opposition to established principles (Small, 2007, Dorward, 2003). Dorward et al (2003) tried to incorporate the role of market forces by including a new component (effective demand) in the DFID framework. They further proposed identifying the impact of institutional and technological changes on livelihood assets (ibid). The modified framework thus emphasizes the linkage between four major interventions (promoting technical innovation, asset building, enabling environment, and appropriate institutional arrangements) and attributes of livelihoods assets (asset productivity, asset portfolio, and access to assets).

Other critiques are related to the de-emphasizing of power relations in the SL framework. According to Bauman and Sinha (2001), power relations essentially have a political dimension and can be built up and used independently to convert rights and assets into capitals for achieving livelihood objectives. Therefore, in conditions where claims are actively contested by different groups, power cannot be considered only in relation to specific "policies, institutions and processes" instead it is best considered as a sixth capital asset – political capital (ibid). They argue that rights that have been politically negotiated in the past give rise to claims and assets the access to which is mediated by existing institutions (structures and processes). Since these rights are continually contested and renegotiated, not including political capital explicitly in the livelihoods framework merely reduces it to a

description of existing power relations and fails to explain how they are constituted and reproduced. This essentially limits the effectiveness of development activities to meet sustainable livelihood objectives (Baumann, 2000).

4.2 Income from forests

Although income measures of poverty have been much criticized, household income at a given point in time is the most direct and measurable outcome of the livelihood process (Ellis, 2000b). The relevance of income as a measure of livelihood outcome cannot be argued as people certainly continue to seek an increase in net returns to the activities they undertake (DFID, 1999). Total household income comprises both cash income and the value of in-kind contributions to the material welfare of the household deriving from the set of livelihood activities in which household members are engaged (Cavendish, 2002, Ellis, 2000b). The total income of rural households is often disaggregated into different categories such as farm income, off-farm income, and non-farm income based on income sources or activities (Ellis, 2000b). Such income categories often reflect different features of the resources required to generate the income – seasonality, accessibility, which may depend on assets and skills, and the location of the resource nearby or in remote places – which thus facilitate a better understanding of poverty and income distribution (ibid). To allow for comparison among different households, an adjustment of total income value taking into account household size, age, and sex composition is also necessary (Cavendish,2002).

Forest income is considered an environmental income according to Vedeld et al. (2007) and Cavendish (2002) or an off-farm income according to Ellis (2000). Sjaastad et al. (2005) made an elaborate case on the challenge of defining environmental income and finally settled for two alternatives – environmental income as value-added or environmental income as rent. Rent is the value obtained after all costs of capital consumption, intermediate inputs, opportunity costs of labor and capital are subtracted. However, in the context of rural areas in developing countries which are characterized by capital market imperfections and low opportunity costs of labor, the measurement of rent is impractical. Thus, measuring environmental income as value-added, without subtracting opportunity cost of labor and capital, can be a better alternative. 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 appropriated" (Sjaastad et al, 2005). Value-added is also in line with normal

concepts of income used elsewhere, thus providing a basis for direct comparisons (ibid). Household forest income is therefore defined as value-added, both cash income and in-kind contributions, from the use of forest products and services[1].

Forest income is important in assessing the wellbeing of forest dwellers, the value of the forests, impacts of community forestry policies, enterprise and market development, and trade-offs among different possible land uses (Wollenberg, 2000). However, rigorous information on forest income is scanty due to the difficulty of collecting the data, inconsistent application of methods, and incomparability of data (Vedeld, 2004, Wollenberg, 2000). This is also partly attributed to the multiplicity of forest products, the diversity of harvesting technology and uses, and the lack of market information on most products (Wollenberg, 2000). The fact that most environmental goods (including forest products) are not traded in formal markets mainly explains their exclusion from conventional economic surveys of households in the past (Cavendish, 2000). Cavendish (2000) made a thorough and reliable quantitative estimate of the contribution of environmental goods to household income in rural areas of Zimbabwe showing the substantial underestimation by quantitative measurements of many rural phenomena such as incomes, consumption, expenditure, nutrition, and agricultural productivity as a result of ignoring the value of environmental goods.

Forest income is an important complement to household income and plays an important role in households' livelihoods by improving food security and reducing vulnerability (Arnold and Bird, 1999, Kaimowitz, 2003, Warner, 2000). The type and amount of forest income (subsistence vs cash) and harvested forest products change differentially with changes in total household income and other socioeconomic characteristics such as sex, age and household composition (Adhikari et al., 2004, Cavendish, 2000, Fisher, 2004, Illukpitiya and Yanagida, 2008, McElwee, 2008, McSweeney, 2002). Despite the increasing awareness of the importance of forest income particularly to poor rural households (Angelsen and Wunder, 2003, Sunderlin et al., 2005) their contribution has remained invisible and is ignored in poverty reduction strategies of many countries (Oksanen and Mersmann, 2003).

[1] This definition follows the common practice of most studies on household income from forest resources that are managed as CPR (Vedeld et al., 2004, Cavendish, 2002). It doesn't measure the change in the value of the forest growing stock through extraction or investment in the study period. However, the PFM contract agreement requires limiting harvest within the growth capacity of the forest and this has also guided the allocation of forest block to user groups.

4.3 Common property management and forests

4.3.1 Common property

As defined by Bromley (Bromley, 1992a), "property is a claim to a benefit (income) stream, and a property right is a claim to a benefit stream that some higher body – usually the state – will agree to protect through the assignment of duty to others who may covet, or somehow interfere with the benefit stream." Property regime is a structure of rights and duties characterizing the relationship of individuals to one another with respect to a particular resource (Bromley and Cernea, 1989). Ostrom (2003) indicated five property rights that are most relevant for the use of common property resources: rights to access, withdrawal, management, exclusion, and alienation. The sets of institutional arrangements established to define these property regimes over resources are identified as state property, private (individual) property, or common property (Bromley and Cernea, 1989).

Common property resource denotes a common pool resource that is accessed and controlled by a group of users recognized as owners (Thomson et al., 1992). Common pool resources may be owned by different types of owners: national or regional government, communal groups, private individuals, or corporations (Bromley, 1992a, Ostrom, 2000). Besides, there are instances of both successful and unsuccessful efforts to govern and manage common pool resources by these different types of owners. Hence, it should not be construed that there is an automatic association of common pool resources with common property regimes (Ostrom, 2000). As a result, Ostrom recommended the term 'common pool resources' instead of 'common property resources' in referring to the physical resource to emphasize that 'property' (social institution) is distinct from 'resource' (a part of the physical and biological world).

The 'publicness' or 'privateness' of a good is a physical attribute having to do with the excludability and subtractability in consumption (Samuelson, 1954, Musgrave, 1959, cited in Ostrom 2003). A good is excludable if the benefit derived from its consumption can be withheld by the owner, and vice versa (Sandler, 1992). A good is subtractable or rival if its consumption reduces the amount available for others and vice versa (ibid). Based on these attributes, four typologies of goods can be identified (McKean, 2000)(Table 1).

Table 1. Typology of goods

	Exclusion Easy	Exclusion Difficult or Costly
Subtractable (rivalrous in consumption)	Private goods	Common pool goods
Nonsubtractable (nonrivalrous in consumption)	Club or Toll goods	Pure public goods

Common pool resources share two attributes of importance for economic activities: i) developing institutions to exclude potential beneficiaries from using the resource is costly or difficult ii) the benefits consumed by one individual will subtract the benefits available to others (McKean and Ostrom, 1995, Ostrom, 2000). Therefore, a common pool resource can be distinguished from public goods and private goods although it shares some attributes of both. Like public goods, the commons is shared and difficult to exclude individuals from using by physical or institutional means and, like private goods, one person's consumption subtracts from the quantity available to others (Janson and Ostrom, 2001, McKean, 2000). These attributes strongly influence people's incentives to produce, manage and consume (Thomson, 1992). Some aspects of forests such as multiple uses and the need to internalize externalities, the spatial variability of productivity, and the challenge of administrative efficiency owing to the extensive area they cover give them the characteristics of common-pool resources (McKean and Ostrom, 1995).

Assigning private rights to common pool resources based on a clear definition of ownership together with a mechanism to adjudicate disputes needs a costly social investment (Runge, 1992). This will be even more difficult in the context of poverty, natural resource dependency, and uncertainties of production over time and space (ibid). On the other hand, unless means are devised to exclude non-authorized users and unless harvesting or use limits are devised and enforced, problems of congestion, overuse and potential destruction could result (Ostrom, 2000). These situations make common property regimes a comparatively rational solution to certain problems of common pool resources management (Runge, 1992). In the absence of management and authority systems that might control the level of use in relation to productivity, a common pool resource is said to be in an open-access situation (Bromley and Cernea, 1989).

4.3.2 Collective action and co-management

Collective action refers to activities that require the coordination of efforts by two or more people in a group and that are intended to further the interests or wellbeing of the group members (Sandler, 1992). According to Hardin (1968) theories on collective action are essentially concerned with the explanation of participation – contributions to collective action. Studies on collective actions attempt to examine the factors that motivate individuals to coordinate their activities to better their collective wellbeing, the underlying parameters behind people's willingness to act so as to achieve a collective goal or why some forms of collective action fail while others are successful (Sandler, 1992). The problem of collective action is relevant and abounds in local and international issues permeating political, economic, and environmental spheres such as deforestation, pollution, global warming, ozone depletion, and other security and health issues (ibid).

The "tragedy of the commons" by Garrett Hardin (1968), the "logic of collective action" by Mancur Olson (1965), and "the prisoner's dilemma" were the three important and related concepts that have been influential in explaining problems of collective action with regard to common pool resources and public goods (Hardin, 1968, Ostrom, 1991, Sandler, 1992). For a long time the problem of collective action was built on the central thesis of the 'free-rider's' problem which states that "as long as individuals cannot be excluded from the benefits that others provide, each person is motivated not to contribute to the joint effort, but to free-ride on the efforts of others and thus, participants choose to free-ride and the collective benefit will not be produced" (Ostrom, 1991). However, a large body of literature based on actual observation of common property management, which was marked by both successful and failed experiences, frequently failed to confirm to this argument (Berkes et al., 1989, Ostrom, 2000). This failure of the 'tragedy of the commons or prisoner's dilemma' as a general theory to explain common pool resource management situations is mostly explained by: its neglect of the existence of some form of communal management and ownership of resources, neglect of the existence of different rules of conduct that constrain individual interest and hence the feasibility of voluntary collective action, and the incorrect identification of common property with an open access situation (Berkes et al, 1989). In the context of common property, unlike the common assumption of isolated and independent decision making, individuals' decision is conditioned on the expected decisions of others (Runge, 1984). Moreover, problems of resource use and management vary in different settings depending on the value of some underlying parameters such as the nature of the resource, technology,

ease of monitoring users' behavior (Ostrom, 1990) and the larger set of existing institutional arrangements (Berkes et al, 1989).

Whereas common pool resources can be managed under private, state or common property regimes, the early theories on collective action implied the superiority of the former two over common property regimes (Feeny et al., 1990, Ostrom, 1991). In many cases, state intervention had the effect of threatening traditional sources of subsistence livelihood; making customary rights highly insecure and thereby destroying an informal co-operation mechanism, and bypassing traditional regulatory authorities and undermining their power and social prestige (Baland and Platteau, 1996). Traditional community management has in some cases also failed to avoid resource degradation owing to the focus only on distributive problems rather than resource management problems and limited knowledge of ecological processes (ibid). Alternatively, shared governance in the form of co-management or state regulation jointly with user self-management is assumed to capitalize on the local knowledge and long-term self-interest of users for efficient rule enforcement (Feeny, 1990). Therefore, creative combinations of the state-based and community-based regimes are expected to provide opportunities to many solutions in different settings (Balland and Plattaeu, 1996, Berkes et al, 1991).

The variety of collaborative or co-management solutions practiced in natural resource management is part of the responses to deal with the challenges from the conflicting interests or the concerns of different social actors in natural resource management (Borrini-Feyerabend et al., 2004). Co-management refers to systems that combine state regulation with local decentralized decision making and thus, combine the strengths and mitigate the weaknesses of each (Singleton, 1998, Balland and Plattaeu, 1996). A multiplicity of concepts and terms are used by different authors and organizations to understand and describe such power-sharing arrangements in managing natural resources (Borrini-Feyerabend et al., 2004, Carlsson and Berkes, 2005). According to Borrini-Feyerabend et al. (2004) co-management is "a partnership by which two or more relevant social actors collectively negotiate, agree upon, guarantee and implement a fair share of management functions, benefits and responsibilities for a particular territory, area or set of natural resources." Understanding co-management as a power-sharing arrangement has led some researchers (Berkes et al., 1991, Sen and Nielsen, 1996) to develop a taxonomy of co-management arrangements depending on the role played by the state and hence the degree of local people's participation – instructive, consultative, cooperative, advisory and informative. On the other hand, Carlsson and Berkes (2005) argued that most instances of collaborative or joint management of natural resources are more complex and sophisticated

than might be concluded from the mainstream image of sharing power and responsibility between the government and local resource users. They therefore emphasized the functional view of co-management as a governance system in which networks of actors are engaged in a continuous process of solving problems of resource management. Such a functional view of co-management is claimed to be appropriate for capturing the complexities involved within the various elements - in the state, the community, the nature of the resource, and the dynamic and iterative nature of the governance system (ibid). Accordingly, the co-management arrangements should be analyzed from the perspective of these functions: allocation of tasks, exchange of resources, linking different types and levels of organization, reduction of transaction costs, risk sharing, and conflict resolution mechanisms.

4.3.3 A framework for institutional analysis of common property management

The institutional analysis and development (IAD) framework (Figure 2) has been widely used in diverse issues during recent decades (Dorward and Omamo, 2009, Ostrom et al., 1994) to understand the roles of institutions in influencing people's behavior and outcomes in the context of collective action. The components and structure of the IAD framework and its application for common property (collective action) problems is well elaborated in Ostrom (2005) and Ostrom et al. (1994). The IAD framework identifies a conceptual unit called an action arena (in this case the participatory forest management) that is the focus of analysis, prediction and explanation of behavior and outcomes (Ostrom et al., 1994). The action arena consists of two major components – the action situation and the actors. Within the context of the action situation, actors engage in various activities which, in the case of PFM, will mainly be appropriation and provision activities related to the collective management of the forest. The structure of the action situation and the interaction of actors within the action arena are also influenced by the rules, attributes of the physical world, and attributes of the community. Agrawal (2001), following a review of the three most influential works of Baland and Platteau (1996), Ostrom (1991) and Wade (1988), also emphasized a fourth factor called external environment which includes laws and regulations, external market and technological changes. However, the importance of this fourth factor will be limited for most single-time period and single-location case studies as it can be assumed to be less variable (ibid).

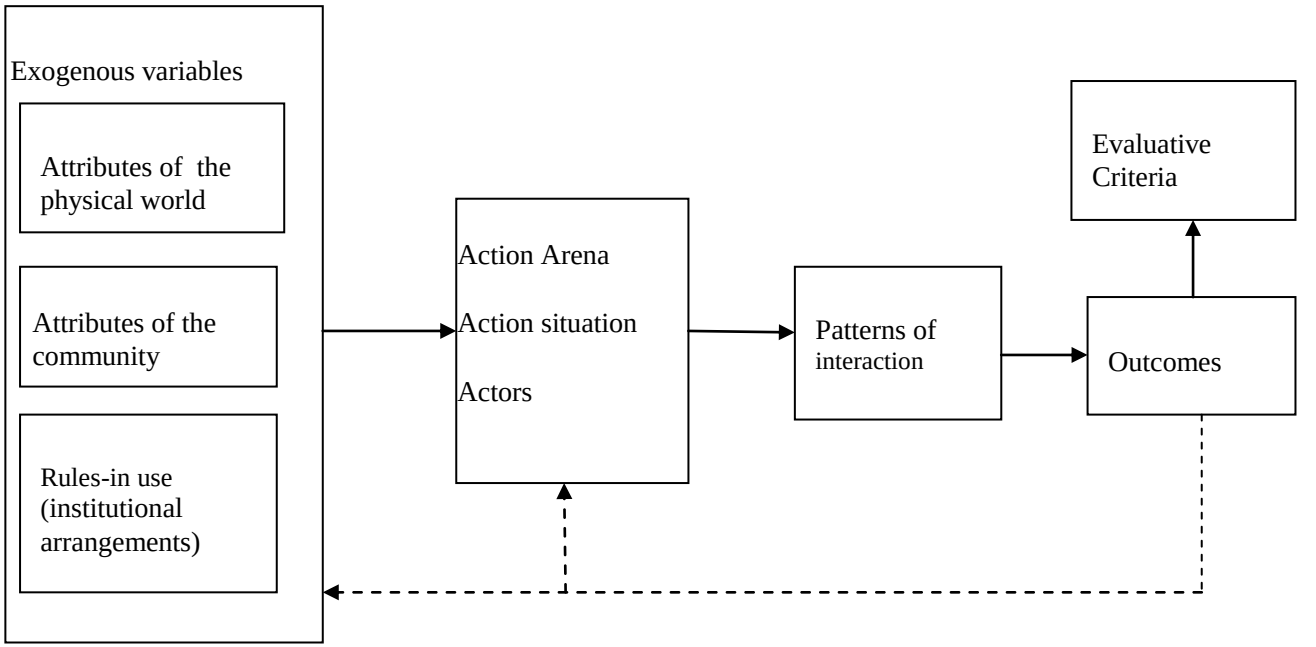


Figure 2. A framework for institutional analysis of common property resources management (Ostrom et al., 1994)

The basic structure of the IAD framework thus, involves an exogenous set of variables that influence the action arena – situations of action and the behavior of actors in those situations – leading to outcomes which then feed back to modify both the exogenous variables and the actors and their situations (Dorward and Omamo, 2009). Therefore, in analyzing the action arena assumptions are made regarding the exogenous variables, the structure of the action situation and the behavior of actors. The following parts will give a brief description of these components in the context of common property management.

Action Arena

The IAD framework conceptualizes the action arena as the social space where individuals interact, and exchange goods and services (Ostrom et al., 1994). The two major components are the action situation and the actors. The action situation involves the participants in an action arena who hold specific positions and make decisions on various actions in light of the information they possess. The basic information involved in the action situation includes information on potential outcomes of productive activities and the costs and benefits assigned to these actions and outcomes. Actors are described with respect to their preferences, decision criteria, and the resources they bring to the situation. In an institutional analysis assumptions must be made about these attributes of the actors. Taking into account all these elements, specific assumptions are made regarding the structure of the situation and the actors. In the oft-cited book of Ostrom et al. (1994) the action arenas considered were local irrigation, forest, and fisheries management.

Attributes of the physical world (resource)

The physical environment will affect the type of possible actions, the resulting outcomes, and the type of information that is accessible to actors (Ostrom et al., 1994). Characteristics of excludability and subtractability strongly influence the incentives to manage and govern (Thomson, 1992, McKean, 2000, Ostrom et al., 1994). When exclusion is difficult and costly, the benefits from a resource are available to a group regardless of contribution which encourages free-riding behaviors (Ostrom et al., 1994). Excludability or protection is also related to the spatial distribution and predictability of the resource so that a concentrated resource is easier to protect than a more dispersed one (Jessup and Peluso, 1986). Therefore, the relative indivisibility of a common property is also a question of scale, determined by specifying the

physical boundaries within which the resource cannot be divided without significantly impairing its management potential or production value (McKean, 2000, Oakerson, 1992). Agrawal (2001) pointed out the importance of two attributes that are given less attention in other works – stationarity and storage. Accordingly, "greater mobility of resources and storage problems make it more difficult for users to adhere to institutional solutions to common pool resource dilemmas because of their impact on the reliability and costs of information needed for such solutions."

The variable nature of resources, and of the goods and services they can produce in specific environments with particular technologies, has important implications for the choice of appropriate institutions (Thomson, 1992). Self-governance is enhanced if the resource is sufficiently predictable, easily recognized by management groups and can be managed beneficially, and if information on important indicators are available at reasonable cost (Ostrom, 1999). Resources with a relatively high economic value are widely believed to be more conducive to common property arrangements (Braedt and Schroeder, 2003, Campbell et al., 2001, Ostrom, 1999). On the other hand, physical limits established by nature or technologies provide critical information for devising rules to maintain a jointly beneficial use (Oakerson, 1992).

Attributes of the community

Attributes of the community that can influence norms of behavior, level of common understanding about action arenas, homogeneity and distribution of resources are important in terms of affecting the structure of an action arena. Such attributes include religious beliefs and practices, traditions and customs, source of livelihoods, the degree of social, cultural, economic and locational heterogeneity, asset ownership, community mores, and level of community integration into the economy and polity (Agrawal and Gibson, 1999, Baland and Platteau, 1996, Vedeld, 2000). Self-governance is enhanced if users: are dependent on the resource, have a common understanding about the resource and the impact on each other, have a low subjective discount rate, possess similar interests and perception of the status quo, and have prior organizational experience (Ostrom, 1999).

The size and the heterogeneity of individual actors within user groups are expected to affect prospects for trust and the degree of divergence in interests and, thus, influence prospects for collective action (Poteete and Ostrom, 2004). However, the importance of specific characteristics of groups may depend on the configuration of other attributes of the resource and resource users (ibid). For example, the size of the group is related to the transaction costs for

collective activity, the burden of responsibility per individual member, and the total assets of the group (Ostrom, 2003). Hence, any difference in group size will also be associated with a change in these variables. On the basis of empirical work in India, Agrawal and Goyal (2001) concluded that medium sized groups are more likely than small or large groups to provide third party monitoring (hiring guards). However, the precise numerical size connoted by small, medium and large depends on the lumpiness and the degree of excludability of the collective good.

In a heterogeneous community, changes in access rules or property rights can affect some groups of the community more than the other groups – for example the poorest of the poor (Reddy and Chakravarty, 1999). According to empirical evidence from the community forests in India, while poorer households obtain much less value from the forests, the forest goods that are more easily accessible within the rules devised were biased toward meeting the needs of wealthier households (Adhikari, 2005). It follows then that for common pool resources providing multiple uses, the operational rules must take into account the relationship among uses so that some uses will not drive other uses out – for instance, physical partitioning of the resource to segregate users while retaining joint use (Oakerson, 1992). Agrawal (2001) however contends that a fairer allocation of benefits may be perceived differently in a society with a highly hierarchical social and political organization. The experience of community forestry in Nepal showed that heterogeneity is not a variable with uniform effect (Varughese and Ostrom, 2001). Although heterogeneity can lead to differences in interests, user groups could overcome them by crafting innovative institutional arrangements as long as the benefits are substantial (ibid).

Past successful experience of self-organization is also one of the important attributes. Long experience in collective action implies stronger social capital in terms of trust, cooperative norms and social networks that result in a higher probability of successful common property management (D'Silva and Sudha, 2003, Ostrom and Ahn, 2001). Previous experiences of cooperation and the presence of active organizations increase the likelihood of success in collective action (Meinzen-Dick et al., 2002).

Institutional Arrangements (Rules-in-use)

Rules refer to the prescriptions that define what actions are required, prohibited or permitted, and the sanctions authorized if the rules are not followed (Crawford and Ostrom, 1995). In the context of common property management rules specify roles and membership (position rules), entry, exit or eligibility to

a position (boundary rules), assignment of actions (choice rules), process of decision making (aggregation rules), rewards or sanctions to particular actions (payoff rules), and access to information. Despite the difficulty of arriving at empirical generalizations about specific rules, it is possible to derive a series of design principles that characterize the configuration of rules for robust common property institutions (Ostrom, 1991). Most long-enduring common property institutions are characterized by some of the following principles: they clearly define the boundaries of users and the resource and they enable easy and rapid resolution of conflicts, the appropriation rules are congruent with the resource and socioeconomic interactions and norms, and provide for the autonomy of user groups to devise their own rules (ibid). Institutions should be relevant to the existing situation and be similar or linked to the existing institutions and must have the capacity to form groups of common interest or cohesion (Arnold, 1998).

Local people are considered to have greater information about themselves, about their needs, and about their natural resource (Agrawal, 1994). Hence, it is believed that they are in a better position to achieve greater "congruence between rules and physical reality" than external groups (ibid). Drawing on the design principles of Ostrom (1991), which are meant for self-organized institutions, Morrow and Hull (1996) made an empirical analysis of these principles for donor-initiated common pool resource institutions in Yanesha forest, Peru. The authors argued that "indigenous CPR regimes that are not self-organized, in which a significant portion of the institutional rules are designed by external actors, are unlikely to meet Ostrom's design principles associated with durability." Accordingly, modifications were proposed of some of Ostrom's principles, such as: appropriators should be able to effectively protect the resource and the need for congruence of pace and scale of the institution with the traditional decision making process.

External environment

The most influential works on the commons including the IAD framework, according to Agrawal (2001), have given limited attention to the set of variables within the external environment. Agrawal included four variables under external environment that can influence the durability of CPR institutions: technology, levels of articulation with external markets, rate of change in articulation with external markets, and the state. Although, national legislation could be of limited relevance to actions at the local level, it can also create an enabling situation to stimulate local management by providing incentives and facilitating responsible devolution (Campbell et al., 2001). External assistance can aid in developing self-governing appropriator

organization if sufficient attention is given to Ostrom's design principles and if external agents play the role of facilitator rather than imposing a pre-crafted institution (Morrow and Hull, 1996).

Ostrom (1999) also put forward that many of the variables in the attributes of users are affected by the type of larger regime in which users are embedded. The size of the population and changes in demographic pressures are significant in influencing the ability of users to create rules to manage resources (Agrawal, 2001). The behaviors of user groups may prove to be insufficient unless they can effectively protect the resource from outsiders (Morrow and Hull, 1996). On the other hand, increasing integration with markets usually has an adverse impact on the management of common-pool resources, especially when roads begin to integrate distant resource systems and their users with other users and markets (Agrawal, 2001, Morrow and Hull, 1996). A sudden emergence of new technological innovations that transform the cost-benefit ratios of harvesting products from commons could undermine the sustainability of institutions (Agrawal, 2001).

In summary, on the basis of a comprehensive synthesis of the three works by Baland and Platteau (1996), Ostrom (1990), and Wade (1988), Agrawal developed a detailed list of the important variables for the sustainability of common property institutions (Table 2).

Table 2. *Enabling conditions for sustainable management of common property resources (Agrawal, 2001)*

Resource system characteristics
➢ small size
➢ well-defined boundaries
➢ low levels of mobility
➢ possibilities of storage of benefits from the resource
➢ predictability
Group characteristics
➢ small size
➢ clearly defined boundaries
➢ shared norms
➢ past successful experiences – social capital
➢ appropriate leadership – young, familiar with changing external environments, connected to the local traditional elite
➢ interdependence among group members
➢ heterogeneity of endowments, homogeneity of identities and interests
➢ low level of poverty

Relationship between resource system characteristics and group characteristics

- overlap between user group residential location and resource location
- high levels of dependence by group members on resource system
- fairness in allocation of benefits from common resources
- low levels of user demand
- gradual change in levels of demand

Institutional arrangements

- rules are simple and easy to understand
- locally devised access and management rules
- ease in enforcement
- graduated sanctions
- availability of low cost adjudication
- accountability of monitors and other officials to users

Relationship between resource system and institutional arrangements

- match restrictions on harvests to regeneration of resources

External Environment

Technology

- low cost exclusion technology
- time for adaptation to new technologies related to the commons
- low levels of articulation with external markets
- gradual change in articulation with external markets

state

- central governments should not undermine local authority
- supportive external sanctioning institutions
- appropriate levels of external aid to compensate local users for conservation activities
- nested levels of appropriation, provision, enforcement, governance

4.3.4 Attitudes and collective action

Attitude is defined as the evaluative dimension of a concept (Ajzen and Fishbein, 1977). It is a summarized evaluation of a concept (attitude object) along dimensions such as good – bad, harmful – beneficial, pleasant – unpleasant, and likeable – dislikeable (Ajzen, 2001). The ability of attitudes to predict behavioral intention made them a major focus of theory and research (ibid). Many studies basically assume that attitudes can be used to predict people's behavior, their responses, acceptance or reaction to development and conservation and thus can serve as points of entry to change the behavior and

commitment of local communities towards natural resource conservation (Ambastha et al., 2007, Badola, 1998, Gelcich et al., 2005, Gillingham and Lee, 1999, Hu et al., 2006, Infield and Namara, 2001, Kideghesho et al., 2007, Lee et al., 2009, Lepp and Holland, 2006, Mehta and Heinen, 2001, Mehta and Kellert, 1998, Rishi, 2007, Shibia, 2010, Shrestha and Alavalapati, 2006, Tessema et al., 2010, Zubair and Garforth, 2006). However, according to the theory of planned behavior (TPB), which was proposed by Acek Ajzen, attitude is one of the three major variables that explain people's behavior. According to the TPB model (Ajzen, 1991), "people act in accordance with their intentions and perceptions of control over the behavior, while intentions in turn are influenced by attitudes toward the behavior, subjective norms, and perceptions of behavioral control." Hence, behavior is explained as a function of these three basic determinants that reflect issues of personal nature, social influence, and control (Ajzen, 2005).

Attitudes are formed on the basis of beliefs (attitudinal beliefs) that link the particular behavior with consequences or outcomes having certain attributes such as costs incurred by performing the behavior (Ajzen, 2005). The perception of behavioral control is related to the availability of resources and opportunities that also reflects people's perception of the ease or difficulty of performing the behavior of interest (Ajzen, 2001, Armitage and Conner, 2001). Subjective norms refer to the perceived social pressure to perform or not to perform the behavior (Ajzen, 2005). All the three together will determine the individual's intention to perform the particular behavior. Previous studies on general attitudes towards community-based natural resource management have shown that the attitude of local people is influenced by the perception of associated benefits and costs which are also a function of socioeconomic factors such as education, income, age and gender (Gelcich et al., 2005, Hu et al., 2006, Mehta and Heinen, 2001, Mehta and Heinen, 2001, Matta and Alavalapati, 2006). Some studies even suggest that the participation of local people in decision making and management activities is in itself an important way of forming a favorable attitude towards conservation (Kassa et al., 2009, Lepp and Holland, 2006). In the context of collective action, Ostrom (1998) underlined the importance of shared norms in strengthening the norms of reciprocity which in turn will enhance the level of cooperation in collective action.

5 Conceptual framework

Forestry is uniquely positioned to contribute to addressing the problems of environmental degradation and rural poverty, given the multiple roles forests can play in the provision of food, the generation of income and the maintenance of the natural resource base (Gow, 1992, Warner, 2000, Kaimowitz, 2003). Participatory forest management schemes aim at achieving these dual objectives of sustainable development. The sustainable livelihoods framework will thus give a good analytic framework in which to examine questions related to forest use, income, livelihood strategies, and poverty alleviation in the context of PFM.

The livelihoods approach highlights the vulnerability context and the capability of rural households, recognizing the multiple sources of risks and shocks, the multiple capital or assets, the construction of diverse livelihoods strategies to maintain resilience, reduce vulnerability to shocks and stresses and improve food security and income, and maintain a sustainable natural resource base. On the other hand, owing to the open access situation of forest production, the methodological difficulties of measuring forest income and proper valuation, the contribution of forest resources and their role in peoples' livelihoods have been neglected or underestimated. Sustainable livelihood provides a suitable analytic framework in which to conceive forests in the context of households' vulnerability, the multiple factors influencing access to forest resources as a natural capital including institutions and other assets, and the place of forest production in the construction of livelihood strategies including diversification. Sustainable livelihood requires the sustainability of the natural resource base, particularly for poor resource dependent households. The people-centered application of the livelihoods framework entails devising management approaches that enable households to manage the resources important to their livelihoods, reduce vulnerability, and achieve livelihoods outcomes including higher incomes and food security.

The multiple products and services of forests combined with the differential spatial distribution and production predictability preclude the divisibility of forests and thus imply their management as common property (Arnold, 1998, Jessup and Peluso, 1986). Scholars of commons have attempted to explain the interrelationship among characteristics of common pool resources, characteristics of user groups involved in collective activities, and institutional design applying the framework of collective action theories and examining the experience of enduring common property management efforts worldwide (Poteete and Ostrom, 2008, Wollenberg et al., 2007, Bromley, 1992b, Agrawal, 2007). Ostrom (1991) divided the problem of collective action in the management of common pool resource into appropriation problems and provision problems. The former refers to problems related to excluding potential beneficiaries and allocating the subtractable flow of an existing common property resource. The latter refers to problems related to devising and applying appropriate rules to provide for the maintenance and management of the common pool resource and avoiding its destruction (ibid). A rough index of 'sustainability' that includes both human and ecological concerns is usually applied as a measure of management success (Feeny, et al, 1990).

Correspondingly, a study on the co-management of forest resource as common property should focus on examining the role of forest resources in the livelihoods of local people, the socioeconomic characteristics of households participating in the co-management, identifying their interests and heterogeneity with regard to forest use, forest dependency, wealth or asset ownership, and attitudes towards the participatory management. Identifying the interplay of these contextual variables in relation to the performance of collective action as measured by livelihoods outcome (income, food security, and sustainability of the forest resource base) will provide insight for a proper identification of important contextual variables related to the resource and user groups. In parallel with the previous experiences of changes in tenure for land and natural resources and the top-down introduction of conservation and development activities in the past, it is likely that the co-management arrangement will also be experienced as an external import among local people. How the participating households perceive the initiative and what attitudes they hold are arguably important aspects in understanding their commitment and the success of implementation. The study will therefore apply the framework of sustainable livelihoods to explore the role of the forest resource as a natural capital and its role in households' livelihoods strategies, reducing vulnerability, poverty and food insecurity. It will use the collective action framework to examine the relationship among resource characteristics,

and socioeconomic characteristics of user groups, and performance in co-management. The theory of planned behavior will be used to investigate the perceptions of local households and to understand underlying motives and factors that influence attitudes and the intention to participate.

6 Methods

6.1 Study area

6.1.1 Location, climate and population

The study area is in the Oromia national regional state (ONRS) of Ethiopia in the West Arsi Zone[2] administrative area in the Dodola *woreda* (district) (Figure 3). ONRS is the largest region both in total area and population. According to the 2007 census, the Oromia region has a population of 27 million. It has a total area of 356,006 km^2 constituting 35% of the total population and 31% of the total area of the country (CSA, 2008). About 12.4% of the population lives in urban areas. The forest area is situated in the Bale Mountains eco-region. The Bale Mountains eco-region is known for its extensive area of Afro-alpine, as the origin of four major rivers which are the only sources of perennial water for the arid lowlands of the east and southeast of Ethiopia, and for its unique and diverse fauna and flora (CRSO-BARD). It is the location of the Bale Mountains National Park and several forest priority areas (ibid). The climate of Bale ranges from tropical in the southeastern lowlands to alpine in the northwestern highlands, the altitude varying between 400 and 4377m a.s.l. (GFA, 1991).

[2] It was part of the Bale zone administrative area at the beginning of the study

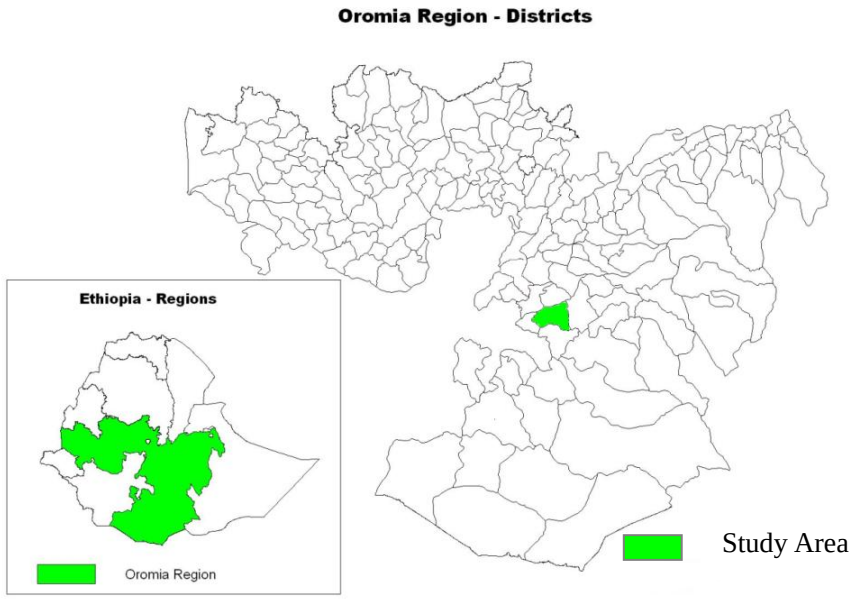


Figure 3. Geographical location of the study area

Dodola is one of the 180 *woredas* (districts) in the Oromia regional state of Ethiopia located at latitude and longitude of 06°59′N 39°11′E. The total population of the district is about 194,000. The urban population of 35, 000 (18%) is one of the largest in the zone (CSA, 2008). An early estimate indicated that 95% percent of the total population belongs to the Oromo ethnic group and the remaining 5% constituted mainly of the Amhara and Guraghe ethnic groups (GFA, 1991). Based on the households sampled in the survey, almost all households are from Oromo ethnic group belonging to 31 different clans. Four clans constitute 74% of the sample households while the largest clan contributes to 37% of the total sampled households.

About 60% of the rainfall comes in the main rainy season from June to August while a small amount of rainfall occurs between January and March followed by a dry spell in May. The main dry season is in November and December (IFMP, 2002). The daily temperature varies between 14°C and 17°C at an altitude of 2500m (ibid). A daily temperature variation between 8°C and 27°C has been recorded for the years 1996 – 2002.

6.1.2 Brief land use history in rural Dodola

According to the synopsis of the integrated forest management project (IFMP, 1999), the vicinities of the study area can be divided into three strata – the farming zone, the forest edge and the upland forest. The farming zone constitutes the vast plain which is virtually devoid of any natural trees but has agricultural crops. The forest edge includes the areas close to the mountain bottoms where farmlands gradually change to scattered remnants of natural forest. The upland forest is in the most inaccessible and climatically harsh areas. Almost all of the existing forest is found along the slopes and ridges of the mountains. It is dotted with patches of grassland and open areas. Homogenous patches of forest rarely extend over more than a few hundred hectares and are found in the very steep and remote areas. The forest cover increases and agricultural plots decrease as altitude increases. The forest vegetation is an afromontane forest composed of the species *Podocarpus falcatus, Hypericum lanceolatum, Hagenia abyssinica, Juniperus procera, Maytenus addat, Rapanea melanophloeos, Allophylus abyssinicus,* and *Erica arborea* (Stipl, n.d). The forest formations and species composition are described by local topographic and altitudinal variation in the forest (ibid).

The total forest area is about 50,000 hectare, mainly located on the mountain slopes extending within the administrative boundaries of some 30 different Peasant Associations (IFMP, 1999). The forest user groups are formed by those households who are settled in the forest. Although the area is designated as forestland by the state, most families claim to have lived in the forest for four to five generations back in time. Cattle-raising is the most important way of life. Some elderly key informants indicated that farming is a recently introduced practice around the Dodola area over the last century. Before 1974 (during the monarchial period), the forest was sparsely populated and the major economic activity was livestock production. A type of shifting grazing was practiced in the early times. The forest area was owned by a few landlords and the remaining population was tenants. Hunting for bush meat was common. Cash income generation by selling forest products was rare except for bamboo. Bamboo was exchanged in the town by poor people for coffee and barley. Some landlords also used to contract their forest for logging. The major crops in the district of Dodola are wheat, *teff* and barley. Wheat is considered to be a cash crop and like teff, only cultivated in the plain. Barley is the most important grain in the mountain areas, used for home consumption only (Schmitt, 2002).

The Adaba-Dodola forest was already an officially designated state forest when the 1975 land reform (the abolishment of feudal land tenure) was

proclaimed (GFA, 1991). It was identified as one of the 41 National Forest Priority Areas (NFPAs) in 1988. Being an NFPA, its administration was transferred from the local administration to the central government. However, it has not been demarcated and gazetted. It was later changed to a regional forest priority area as a consequence of being administered by the regional government following decentralization. Some part of the forest is inhabited by legally registered farmers (Kubsa, 1998). These people were also permitted to use forest products for household consumption. Otherwise, legally local people were prohibited from entering and using the forest. In the 1980s, an attempt was made to settle all forest dwellers in one area within the forest through a villagization program. However, the local people didn't accept the stated government's motive for villagization and thus resettled in their former area after the fall of the 'Derg' government.

Forest management, protection, and planting activities by the local forest department were focused on the plantation areas that were established in the peripheries of the natural forest. Illegally harvested timber and pole were seized and confiscated only when it was noticed. Otherwise, active inspection and guarding in the natural forest was very weak. Logging concessions used to be given in the past. Hence, marking trees for harvesting and measuring the volume of the harvest were among the major tasks of the local forest department. Some informants among the local people also believe that past logging activities have reduced the stock of *Podocarpus falcatus* and *Hagenia abyssinica* trees, and this been confirmed by the inventory of the Integrated Forest Management Program (IFMP) document (GFA, 1991). These two species together with *Juniperus procera* and *Cordia africana* were banned from logging by the 1994 proclamation on forest conservation and development. The same inventory shows that the forest cover shrank by 10% over a period of nine years (1975 – 1984). In the same period fifty seven (57%) of the closed forest was converted to disturbed forest. It is also evident from the stand structure that the good quality and merchantable-size trees of the commercial species were selectively logged out.

6.1.3 Socioeconomic description

The agricultural system of Bale is predominantly a cereal farming system (WBISPP, 2000). The crops are mainly cereals, pulses and oil crops with root crops generally being of minor importance. On the other hand, integration between crops, livestock and trees is very weak compared to other agricultural systems. Livestock provides draught power but manure is not important in the cropping system. Accordingly, the cereal land system in the Bale-Arsi

highlands is characterized by very large plateaus that are almost totally devoid of trees except the steeper uncultivated slopes where remnants of the natural forest can be seen (ibid).

For the Dodola area, June, July and August constitute the growing season when the cultivation, seeding, fertilizing and weeding activities take place. September is the month with a relatively low level of agricultural work. Harvesting starts in October for barley, November for teff, and between November and December for wheat. Harvesting can continue through January until the produce is separated by thrashing and finally placed in the granary. There is also a relatively low level of agricultural work in February. Preparation of the land for the coming growing season starts in March. Forest product harvesting in those areas with crop production takes place mainly in the months of June, July and August. However, in the upland areas, where crop cultivation is very limited, the harvesting of forest products can take place at any time of the year unless the rainy season causes transport difficulties. June, July and August are also the months during which there will be some scarcity of food in the households as well as a drain of cash owing to agricultural expenses.

Depending on the location, local people must travel for 30 minutes to three hours to reach market places. The nearest large market beyond Dodola is the Shashemene market, situated 70km along the main road. Agricultural and forest products, except livestock, are sold in the nearby towns (Dodola town and Herero town). Cattle, horses and donkeys are sold in Asasa town, which is about 17km from Dodola town. A total of eight – ten hours is required for a round trip together with animals to the livestock market. Sheep and goats are supplied in the same market as agricultural crops. The Dodola market is the largest market in the vicinity. There are two market days during a week (Monday and Thursday) when products particularly those produced in the rural areas are exchanged in the market.

Forest utilization for both household consumption and sale of wood products is common (Schmitt, 2002). However, the level of forest management activities by local households is limited with the exception of some knowledge of different tree species and established species preferences for various forest products (ibid). The major forest products supplied to the market include timber (planks), poles, charcoal and firewood. Timber and poles are usually supplied directly to private consumers, traders, or to private sawmill owners. They are not sold on the open market. Charcoal and firewood are however sold on the open market. A considerable amount, particularly of charcoal, is purchased on the open market by traders from other nearby towns. The major wood products are supplied in different dimensions (Table 3). Other forest

products supplied on the market include wooden discs (for the top of huts), mortars, furniture, handles, farm implements, vines, and various household containers made of wood.

After the organization of the WAJIBs into a cooperative, the households have been expected to sell their forest produce to the cooperative. Supplying to the local market is considered an illicit practice. Similarly, timber products bought from the local market are considered as contrabands and cannot pass check points. Traders must therefore bid for and buy these products from the cooperatives and obtain authorization from the agricultural bureau to transport them to larger towns such as Shashemene. Otherwise, they have to smuggle them illegally. However, as the price set in the cooperative is less flexible and usually lower than the market price, considerable numbers of households still sell to consumers or wholesalers in the town. Forest products, including charcoal and firewood are also purchased by traders from nearby towns such as Assasa who transport and resell these products for profit. The vast plains to the north of the forested mountains are characteristically devoid of trees and greatly dependent for forest products on the Dodola and other nearby forest areas.

Table 3. *Dimension of Timber Products (Schmitt, 2002)*

Dimensions	Forest Products		
	Timber products		
	Hagenia Planks	Podocarpus Planks	Juniper Planks
Length (m)	2	4	4
Width (cm)	30 – 40	6	20 – 25
Thickness (cm)	3.5	5	2.5
Average volume (m^3)	0.025	0.012	0.022
	Poles		
	Juniper poles (short)	Juniper poles (long)	
Length (m)	3	4	
Diameter (cm)	10 – 15	10 – 15	
Average volume (m^3)	0.035	0.05	

6.1.4 Tenure institutions

Customary institutions were stronger and important in the early times, particularly during the monarchical period. The forest area was owned by a few landlords who used to grant the right to live in the forest to tenants and collected taxes in return. Forest use by local households was mainly for

subsistence purposes, and every household was able to gather products for its needs. However, commercial logging was done only by the landlords, who usually granted concessions to sawmill factories. The customary institutions mentioned by key informants were in relation to the control of grazing areas. There was a custom of rotational grazing, where animals grazed only in designated areas. Every year at the start of the main growing season, a traditional ritual would be conducted where elderly people made blessings and launched the opening of an area to graze during the year. After 1974, when the socialist government came into power and nationalized land and natural resources, these customary rules became weak and irrelevant. Discussions with key informants revealed that there are still some traces of ancestral claim to areas in the immediate vicinity of one's residence. Hence, there is customarily a sense of ownership of the territory that people can view from their homestead. No form of forest use, including putting beehives on trees, is allowed in this area except by the respective inhabitant of the area. This was also recognized by every other member in the community.

As of 1975, land and natural resources became public property. According to the 1995 constitution of the federal democratic republic of Ethiopia, the right to own all types of land and natural resources belongs exclusively to the State and the peoples of Ethiopia. Land is proclaimed as a common property of the peoples of Ethiopia and shall not be subject to sale or any type of exchange. Ethiopian peasants and pastoralists have the right to get land free of payment for cultivation and grazing and have the right not to be displaced from their own lands. Nevertheless, the regional government rural land administration and use proclamation number 130/2007 prohibits selling fixed assets such as coffee and fruit trees. It is however permitted to contract out the harvest from these fixed assets for a maximum of three years and to the maximum of half of one's landholding. The landholder also has the right to use and lease his holdings, and to transfer this to his family members and to dispose of property produced thereon. The landholder is also allowed to rent half of his landholding for a maximum of three years.

Prior to the current proclamation, number 542/2007, of the federal government which came into effect in September 2007, almost all the high forests were either State or regional forests. As stated in the forestry conservation, development and utilization proclamation number 94/1994 of the transitional government, it was the responsibility of the State and regional governments to designate, demarcate and register State, regional and protected forests (Proclamation no.94/1994). Community forest ownership was not included in proclamation number 94/1994. On the other hand, the regional government forest proclamation – Forest Proclamation of Oromia proclamation

number 72/2003 – identified community forestry as one of the three ownership types. Accordingly, community forests could include State owned forests or other patches outside State forests that are handed over to an organized local community (Proclamation no. 72/2003). The proclamation stipulates that the utilization of community forest should be according to the agreement among community members that is approved by the authority. The community members have the right to use forest products sustainably. They must also protect against encroachment, to ensure that utilization is less than forest growth and pay the rent set by the authority.

On the other hand, the current proclamation number 542/2007 of the federal government explicitly recognizes two ownership types – private forest and State forest. Private owners include individuals, associations, governmental and non-governmental organizations that want to develop forests. Forests that have not been designated as protected or productive state forests can be given to such private developers to be conserved and utilized in accordance with directives to be issued by the appropriate body. Private forest developers must comply with directives issued on the safety of the environment, conservation of catchments, biodiversity and unique natural trees and wildlife. However, communities living within a state forest are permitted to inhabit the forest area while participating in the development and conservation of the forest (Proclamation no. 542/2007).

6.1.5 The participatory forest management project

The process of establishing participatory forest management started with the integrated forest management project (IFMP). The IMFP in Dodola had the objective of managing, developing and conserving the forest while taking into consideration the demands of the growing local population (GFA, 1991). A multi-sectoral strategy that links forestry with agriculture was designed to alleviate pressure on the forest resources and to promote sustainable management. Forest utilization by local people in the form of pit-sawing, construction timber, fuelwood extraction, charcoal production and forest grazing and browsing were therefore well recognized in the planning of the integrated forest management project (ibid). The project document recommended the incorporation of traditional users of the forest in the management plan of the project, although details on the harvesting and the distribution of resources among beneficiary households were not clearly specified. The planned commercial logging was not realized owing to the severity of the degradation of the forest and thus the major emphasis was shifted to halting the process of deforestation and conserving the remaining

forest (personal communication with project manager, July 2006). Accordingly, participatory planning of integrated forest management were undertaken to reduce the dependence of the local people on the forest resource by facilitating diversification of income into non-forest based activities (Adebo and Jonfa, 1996). Some development activities were subsequently undertaken, including construction of water dams, grain stores, access roads and forest camps for tourism (Lemma, 1999). The impact of these development activities in curbing the deforestation process was limited (ibid). A community-based forest management in the form of a forest protection committee at different levels was also established to regulate forest use (Tippmann, 1998). Despite the empowerment of this committee to exercise control by issuing permission to needy households and suing illegal harvesters and trespassers, the arrangement was not as effective as planned in terms of precluding intrusion and illegal exploitation of the forest (ibid).

The current participatory forest management (PFM) project at the Adaba-Dodola regional forest priority area was finally initiated in response to the failure of previous efforts and was also inspired by other participatory forest management activities already underway in different parts of the country (Kubsa, 1999, Tippmann, 1998). It was started as a pilot project with the major goal of organizing the local community into a Forest Dwellers' Association (FODWA). The association is officially recognized under the name of WAJIB, which is an acronym for a forest dwellers' association by the local language (*Oromifa*). The first legally binding contract known as the Forest Block Allocation Agreement (FBAA) was elaborated through consultations between the stakeholders and was afterwards officially approved by the Oromia regional council in February 2000 (Kubsa et al., 2003). Recently, in 2008, the Bureau of Agriculture was withdrawn from the contract agreement and replaced by Arsi forest enterprise. The Arsi forest enterprise was established in 2007 by regulation number 86/2007 of the Oromia regional state. It operates under the Oromia regional state forest enterprises supervising agency, which was also established by Regulation no 84/2007 of the Ormoia regional state. The Arsi forest enterprise, which is owned by the regional state, will continue to be one of the signatories of the contract agreement, taking the place of the agricultural bureau. The establishment of WAJIB is currently expanding to other parts of the forest.

Each WAJIB group also has a by-law to guide the various activities in the WAJIB. The main contents of the by-laws include: decision making procedures, responsibilities and power of committees, rules for forest use and management, and penalties for violators of the rules. WAJIB members are responsible for protecting the forest, carrying out management activities based

on a mutually agreed upon management plan, and paying rent for leasing the forestland from the government. They also have the right to live in the forest with limited farming and grazing activities there, and to get other forest-based benefits, including collecting forest products for household consumption and sale. The rent of the forestland (equivalent to one USD per hectare per household during the WAJIB establishment) considers only the land area in the user group that is not covered with forest (Kubsa et al., 2003). This is expected to be an incentive to expand the forest area within user groups. Moreover, 40% of the rent is retained by the local administration to be used in development activities that benefit the whole community.

A membership and block boundary was made on the basis of the settlement pattern. The maximum size of the WAJIB group per forest block was limited to 30. Priority in the selection of members is based on the length of residence in the forest. According to the explanation given by informants, the duration of residence is not necessarily based on the establishment of the respective households but also considers the settlement of their ancestors. For this reason, a newly established household that descends from a family that has lived in the forest block for a long time can be given priority over an older household whose ancestors are recent settlers. This rule was assumed to be in line with the traditional way of laying claims on rights to land. There is no maximum limit to the area of the forest block, but a minimum of 12 hectare should be available per household. The size limit of 30 households per user group is strictly followed, however, and households in excess of that number are evacuated[3] even if the area of the forest block can accommodate more members on the basis of the allocation rule of 12 hectare/member (> 360 ha). Therefore, both the area of the forest block and the number of WAJIB member households (within the maximum limit) varies among WAJIB groups.

6.1.6 Framing of the study

Poverty environment network (PEN) framework

PEN[4] is an international network and research project on poverty, environment and forest resources. It was launched in September 2004 by the Center for International Forestry Research (CIFOR). The main objectives are to investigate and explain the relationship between poverty and forests in tropical areas by collecting global data using comparable definitions, questionnaires

[3] Evacuees will be settled by the local administration within the same peasant association
[4] http://www.cifor.cgiar.org/pen/_ref/home/index.htm

and methods (PEN, 2008). PEN works on two major research questions: (1) what is the current role of forests in poverty alleviation and (2) How can that role be enhanced through better policy formulation and implementation? PEN currently works closely and in partnership with universities and research institutes on all continents. Its aims are to fill the knowledge gap on the forest-poverty nexus and hence to contribute to meeting the Millennium Development Goal of poverty reduction through a systematic collection of uniform socioeconomic data in a variety of tropical ecosystems.

The major thrust of PEN is applying uniform definition of important concepts such as forest, forest income, household and the use of quarterly surveys for income information. PEN aims at more accurate and reliable data by using three-months and one-month recall period for different types of income generating activities. Recall periods were determined based on the recommendation of studies that have demonstrated higher accuracy and reliability of data when the recall period is shortened, particularly for irregular income sources such as forest extraction. Moreover, short-recall period help to capture the seasonal variation of forest income.

The PEN research format is based on three types of surveys – village level surveys, annual household surveys and quarterly household surveys. A total of eight surveys – two village surveys, two annual household surveys, and four quarterly surveys – are employed to collect village level and household level data. Quarterly household surveys are used to collect income information while all other non-income household information is collected with the two annual household surveys at the beginning and end of data collection period.

The author of the study has joined PEN as a partner and thus, the PEN format for data collection has been adopted for most of the income data. Although some additions and structuring have been made, the content and structure of the PEN survey instrument were very appropriate for the needs of the study, particularly income and most socioeconomic information. However, there have also been some additions to meet the data requirement of some of the research questions, particularly for the paper II, paper III and paper IV.

Selection of villages and households

The forest area included in the study extends over four different peasant associations located contiguously. Peasant associations (PA) are the smallest units in the administrative structure of rural Ethiopia. The administrative structure of *wereda* and *kebele* councils (*peasant associations*) was first developed during the Derg regime, with the primary objective of implementing the land reform throughout the country in the mid-1970s (Proclamation no. 31

/1975). In principle each *wereda* has about one hundred thousand inhabitants. Each *kebele* has on average five hundred households and in the rural context will lie on about 800 hectares of land. For the sake of practicable participatory management design, inhabitants of the different PAs were formed into user groups (WAJIB) of not more than 30 households. Therefore, despite the spatial contiguousness of the forest area, it was split into separate forest blocks to be managed by each user group. These user groups are small settlements (villages) that are mainly composed of close relatives and clans. Some WAJIBs were established by splitting villages into forest dwellers and non-dwellers. Some villages were also split into different WAJIBs as the number of households was above the maximum limit of 30.

Households in this study are defined according to the following definition of the PEN format:

> A household is defined as a group of people (normally family members) living under the same roof, and pooling resources (labor and income). Labor pooling means that household members exchange labor time without any payment, e.g., on the farm. Income pooling means that they "eat from the same pot", although some income may be kept by the household member who earns it.

According to the design of the co-management arrangement, the maximum number of households in a user group is 30, although some user groups are as few as 16 households. There were more than 50 user groups that were already established at the start of the field work. New user groups have been established since then and there are still more in the process of establishment. The study considered the relatively older user groups (greater than four years old) at the beginning of data collection. User groups in the upper altitude that also have heather lands (predominantly alpine vegetation) were excluded for methodological reasons. Of the remaining 32 user groups, 22 were randomly selected for the study. The size of the 22 forest blocks included in the sample ranges between 200 and 560 hectares.

From each of the selected 22 user groups, 60% of the households were randomly selected for the survey. While 50% was the planned sampling intensity, 10% were included to compensate for possible attrition during the study period. This has given a total of 352 households, the number of households per user group ranging from 10 – 18.

The following are brief descriptions of the user groups included in the sample.

De*neba Peasant Association*

Deneba PA includes those WAJIBs that are located at the forest-agriculture frontier. Owing to their location and relative accessibility, most of the forests in these WAJIBs have been exposed to massive exploitation (Table 4). Particularly, the Faraqassa WAJIB is very close to Dodola town. The nearest market place is the Dodola market.

Table 4. *User groups in the Deneba Peasant Association*

User group (WAJIB)	Total area (ha)	Forest area (ha)	Population	No of households	Dominant Clan
Tarura	348	282	202	25	Abena
Eddo-Witte	413	317	215	30	Shedama
Eddo-Sibilo	373	266	258	30	Wodhitu
Birbirssa-Guxxa	370	164	205	30	Wodhitu
Faraqassa	376	310	235	30	Shedama
Anonu-Lobe	293	210	195	24	Bidiqa
Lobe-Gutu	364	302	207	30	Bidiqa
Total	2537	1851	1517	199	

Berissa Peasant Association

The Berissa PA consists of the oldest WAJIBs (Table 5). The new concept of forest dwellers' association was first accepted in the Berissa peasant association. Most of the WAJIB's in the Berissa PA are also found at the forest frontier and close to the main road. Thus, there has been massive exploitation before the establishment of WAJIBs. The nearest marketplace is the Dodola market.

Table 5. *User groups in the Berissa Peasant Association*

User group (WAJIB)	Total area (ha)	Forest area (ha)	Population	No of households	Dominant Clan
Bulchanna	424	296	162	16	Doda and Shedama
Sulula	358	290	204	27	Shedama and Doda
Ali	347	234	228	30	Doda and Shedama
Gedde	533	460	239	28	Shedama and Doda
Total	1662	1280	833	101	

Burra-Challe Peasant Association

Although some of the WAJIBs in the Bura-Challe PA (Table 6), such as Qore-Goro and Mararo-Urgo, are found closer to the main road and have undergone massive exploitation, most of them are found off-road. Their forests are in better condition than the Deneba and Berissa WAJIBs. The nearest marketplace is the Herero town market area.

Table 6. *User groups in the Burra-Challe Peasant Association*

User group (WAJIB)	Total area(ha)	Forest area(ha)	Population	No of households	Dominant Clan
Jaldo	364	328	135	20	Doda
Qoranta	201	152	110	16	Doda
Xuqa carra	356	308	213	29	Doda
Mararo-Urgo	309	291	167	25	Doda
Qore-Goro	361	290	210	30	Doda
Kembo	341	268	167	27	Doda
Xosoge	495	361	213	30	Doda
Dhebisa Xosoge	300	223	208	25	Doda
Total	2727	2221	1423	202	

Adele Peasant Association

This PA consists mostly of the high altitude areas (Table 7), which are in the most remote location. A considerable number of them have heather lands in addition to high forests. The commonly used marketplace is the Dodola market.

Table 7. *User groups in the Adele Peasant Association*

User group (WAJIB)	Total area(ha)	Forest area(ha)	Population	No of households	Dominant clan
Hobancho	385	302	182	30	Magida and Doda
Karro	238	189	113	18	Doda
Bakicha	325	274	166	26	Doda
Total	948	765	461	74	

6.2 Data collection

6.2.1 Introducing research and researcher

The purpose and substance of the research work were introduced to all the relevant bodies including the district administration and officials of the district agricultural bureau. Contact was first made with the officials of the district bureau of agriculture. The district office in turn wrote a support letter to the district administration and the four PAs in charge of the villages' administration.

Two top leaders (chairman and secretary) of user groups, chairpersons of PAs, and unions gathered in the town hall on March 25, 2007. At this meeting the purpose and significance of the research were introduced with the help of a project staff and one translator. After a discussion of some concerns raised by the participants, the leaders of each user group were given a numbered list of their respective members to draw a lottery for sample households. Finally, a schedule was set up with the leaders for meetings to discuss the purpose, significance and process of the survey with households selected for the survey. According to the convenience of the time and place, six such meetings were held between March 31st and April 10th, 2007 with the 22 user groups put together with respect to their proximity to each other. The meetings also provided the opportunity to arrange appointments for the first village survey.

6.2.2 Enumerator training and testing questionnaire

Enumerators were selected on the basis of education level, previous experience in related research, ability to carry out the survey, the will to work in the relatively remote and harsher environment, and commitment to be engaged for the full period of the survey work. Each enumerator was assigned two adjoining villages (user groups) where an average of 32 households were to be interviewed. Enumerators with good experience and better training were assigned the task of assisting the researcher in supervising the work. The survey team included 15 enumerators and supervisors in addition to the researcher. All enumerators were from the local area and were hence familiar with the language and culture of the local people.

The draft questionnaire was translated to the local language (*Oromiffa*) and given to every enumerator for possible comments for final adjustments. Important definitions and codes were also translated and provided in advance to every enumerator. The enumerators were trained in two sessions. The first session dealt mainly with introductory aspects of collecting socioeconomic data from people and the second dealt with conducting interviews using the

questionnaire. Enumerators' training was done about two weeks before carrying out each type of survey.

Finally, the test survey was conducted in 30 households in two villages not included in the survey. Some questions were split for greater elaboration and missing items such as lists of property were included. Some questions were broken up into simpler parts to facilitate understanding and obtain more precise response. Questions were translated and adjusted so that they would be presented in the usual way of communication and in a simpler way to the respondent. For example, products in a single category but that had different purposes (qualities) and/or were measured in different ways locally were listed to make questioning easier. Thus, fuelwood, seeds, draught power etc have different categories and could be recorded more than once for each household.

The test interviews revealed that questions related to income, area of land and number of cattle are usually considered private. The details of the questions further exacerbated the tension in the interview. Some households were not initially comfortable about counting their livestock for traditional beliefs. For these reasons, meetings with sample households were planned and conducted just before the beginning of subsequent surveys.

6.2.3 Conducting the surveys

Reconnaissance fieldwork was done to form a general view of the background information on the area. The purpose was to obtain information on local people's accounts of population trends, land use, forest resource tenure and use, perceived problems in forest management, and views on the process of participatory management planning and its impact in terms of social relationships and livelihoods. This work was mainly carried out as key informant interviews with randomly selected households including WAJIB members and non-WAJIB members, elderly persons and women. Interviews were also conducted with experts in the local agricultural bureau with long work experience and with former forest guards.

Village surveys were conducted two times – at the beginning and end of the data collection period. They were carried out as group discussions involving five to ten people. The first village survey included village-level information such as major agricultural and forest products, institutions, infrastructure, trends in forest resource availability, main forest management and other activities in the WAJIB. The second village survey mainly concerned the vulnerability context during the survey year, such as major sources of shocks or risks during the survey year, the prevailing prices of wage and crops, and annual rainfall.

The annual household surveys were also conducted at the beginning and end of the survey period. Household level socioeconomic information and coping strategies were collected. The second annual household survey also included information related to attitudes and perception of households about collective action. Quarterly household surveys are carried out to collect income information and engagement in collective forest management activities. The reports on forest, environmental, wage, and business incomes and on collective activities were based on a recall period of one month whereas the recall periods for crop income, livestock income and transfer payments were three months. The first quarterly survey covered the period between April and June, when the main rainy season starts and land preparation activity is resumed. The second survey covered the period July – September when sowing and weeding is undertaken for main agricultural crops. The third covered the period of October to December when the major crops are harvested in lower altitude areas and most of the upper altitude areas. The fourth survey covered the period January to March. A final data collection in the form of a group discussion was carried out to identify the major types of livelihood strategies, their importance, and factors associated with adopting livelihood strategies. Enumerators were instructed to contact respondent households in advance and make appointments to conduct the interviews. Both heads of the household are encouraged to participate in the household surveys. The group discussion (village surveys) are based mainly on structured and semi-structured interviews (see annex). The data collection activity was done according to the schedule indicated on Table 8.

Table 8. *Timeline of data collective activity*

Questionnaire	Contents	Timing
Village Survey 1	Village level data on forest use, important forest products, institutions, user groups activities, infrastructure, demographics, secondary info on GPS coordinates, total forest area,	April 2007
Village survey 2	Village level data on risks, prices of staple food, land rent, payment for forest services, pilot survey on attitudes and perceptions	March 2008
Annual Household survey 1	Socioeconomic data at household level, including household size, composition, physical assets, land, age of household, marital status, saving and debt,	April 2007
Quarterly Household Survey 1	Household income data, engagement time spent in user group activities	June 2007
Quarterly Household Survey 2	Household income data, engagement time spent in user group activities	September 2007

Questionnaire	Contents	Timing
Quarterly Household Survey 3	Household income data, engagement time spent in user group activities	January 2008
Quarterly Household Survey 4	Household income data, engagement time spent in user group activities	March 2008
Annual Household Survey 2	Household level data on income crisis, payment for forest services, welfare perception, social relations within user group	May 2008
Group Discussion	Types, importance, and determinants of livelihood strategies	June 2009

6.2.4 Secondary information

Weather data

Weather data for the forest area is not available. The nearest weather stations are located in surrounding state farms situated in the agricultural plains. These areas are expected to receive lower rainfall than the forest areas. Comparisons of rainfall data showed that the plains receive 35% and 27% lower rainfall than the forest areas. Therefore, weather data are obtained from the records of the stations established by the GTZ project at Dodola in 1996. The data available are for only seven years (1996 – 2002).

Estimation of population and major land uses

The total population was not directly accessible from existing information and neither was it possible to undertake a census. Hence, the population was estimated by taking the surveyed households as samples. As a 60% sampling intensity was used, a good estimate is expected. The forest and shrub areas are estimated using satellite images of the area from the year 2008. The agricultural land is estimated using the values taken during the first annual household survey and determined in a way similar to the population estimation.

6.3 Statistical analysis

The statistical methods include descriptive statistics, analysis of variance, regression analysis (linear regression and logit regression) and multivariate analysis (cluster analysis and principal component analysis) (Table 9). The non-parametric method of the Mann-Whitney test was also used in paper III.

Table 9. *Statistical methods used in data analysis*

Paper	Unit of analysis	Statistical analysis	Purpose
Paper I	Household	Analysis of variance	To describe income classes in terms of socioeconomic characteristics, distribution of income among income sources, and the importance of forest products
		Regression analysis	To identify socioeconomic factors related to forest income and total income of households
Paper II	Household	Principal component analysis	To aggregate relative income values into three composite variables
		Cluster analysis	Separate households into livelihood strategy typologies
		Analysis of variance	To describe livelihood strategy groups in terms of income type and diversification
		Chi-square tests	To describe livelihood strategy groups in terms of poverty incidence and food security
Paper III	User group (WAJIB)	Descriptive statistics (mean, percentage values, inter quartile range) and Gini coefficient	To aggregate household level data to user group attributes such as heterogeneity, forest dependence, and other attributes of user groups
		Principle component analysis	To combine different measures (dimensions) of performance into a composite variable (performance index)
		Analysis of variance	To describe and compare user groups in terms of the various attributes used in the study
		Chi-square tests	To compare user groups
Paper IV	Household	Correlation and regression analysis	To identify factors related to attitudes and intentions

7 Summary of papers

7.1 Paper I: Forest incomes and poverty alleviation under participatory forest management

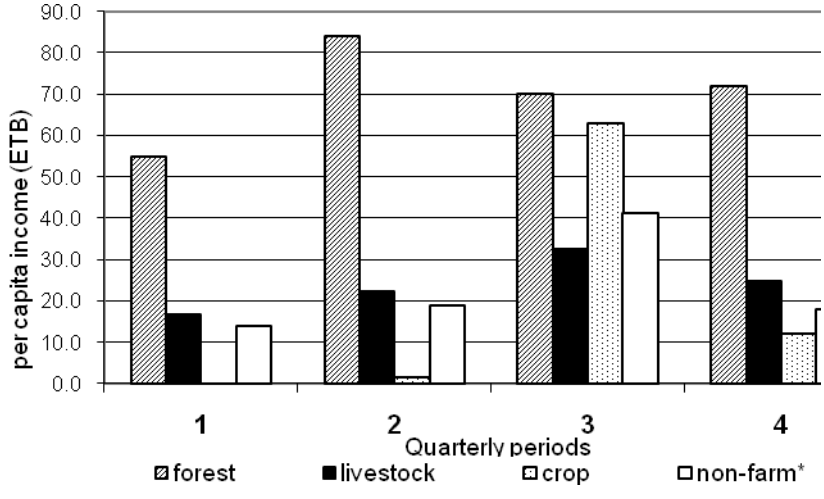
The recent focus on development, environment and sustainability resulted in increasing interest in the contribution of forest resources to livelihoods of local people. Local people are recognized as important stakeholders in the management and conservation of natural resources. Researchers and policy makers have tried to explain the link between poverty, dependence on forest products, and deforestation. The main concern in this regard includes understanding the potential of forest-based productive activities in poverty alleviation and identifying the constraints or means to realize this potential. Many studies on patterns of forest use (seasonality, in times of crisis, among socioeconomic groups) and forest income are undertaken in different parts of the world in different forest ecosystems. The purpose of this article is to explore and describe the role of forest products in the livelihoods of households participating in the co-management (WAJIB) arrangement.

The livelihood framework was employed to explain the role of forest in people's livelihoods. From a sustainable livelihood perspective, forests are natural assets that contribute to household cash income, food security, reduced vulnerability and improved wellbeing through non-material benefits. The results show that the major assets of households are livestock and cropland whereas ownership of physical assets and financial assets (savings) are generally low. In general, female headed households have lower livelihood assets including adult labor, education level, number of large livestock, and area of cropland. The main sources of income are crop production, livestock production and extraction of forest and environmental products. Forest products constitute an important part of the household income portfolio contributing 34% of total per capita income, followed by livestock (30%), crop

(26%) and environmental products (6%). Other income sources – private business, remittance, transfers and wage – constitute only 4% of the total per capita income.

The major forest products reported by households include firewood, poles, timber (planks), wood splits, charcoal, logs, tree branches, wooden tools and medicinal plants. However, 71% of total forest income comes from firewood, poles and timber. In terms of relative income, firewood is the most important forest product for all households although it is more important to the lower income groups. Whereas products such as firewood and poles, which can often be obtained from dead and dying trees, are the most frequently used products by all income classes, timber appears to be more accessible by fewer, better off households. Production of timber and poles is mainly to generate cash income.

Forest income helps many households from falling under the poverty level. If forest income is excluded, the incidence of poverty would rise from 31.7% to 51%. Regardless of income level, forest income is an important source of cash income and contributes substantially to financial expenses in crop and livestock production. Households on average earn 52% of their cash income from forest products. Forest income is more or less continuous over the year, while the variation over seasons reflects patterns in the availability of household resources such as cash, food and labor and the volume of activity of agricultural activities (Figure 4). Forest income also changes in times of crisis. Increased sale of forest products was the only, the main, or a part of the coping strategy for 26%, 11%, and 4% of households who faced income crisis, respectively. Forest income also reduces income inequality among households by about 15% as measured by the Gini coefficient.



*non-farm=business, wage, remittance, transfers

Figure 4. Seasonal distribution of cash income among different income sources

The results indicated that higher income households are better educated, have a large number of livestock and possess more physical assets. Although there is no significant difference in area of cropland between high income and low income households, the productivity of cropland and crop production are different. Higher income households employ more capital intensive production in the form of a higher use of inputs such as fertilizer, hired labor, rented land and harvesting machines. When forest income is considered, households in the top quintile income class earn four times as much forest income as the lowest income class whereas their dependence on forest income (ratio of forest income to total income) is less than half (0.46) of the lowest quintile class (Table 10). Dependence on the forest also decreases with area of cropland and number of large livestock and increases with the distance from the town.

Table 10. *Per capita total and relative forest income values*

Incomes (ETB)*	Income quintiles					One way ANOVA F-test
	1	2	3	4	5	
Total income	499	935	1 343	1 909	3 676	
Forest Income	*224*[a]	*309*[a]	*412*[a]	*510*[a]	*905*	***
Total cash income (TCI)	172[a]	309[a]	373[ab]	607[b]	1160	***
Total forest cash income (TFCI)	116[a]	188[ab]	226[ab]	344[bc]	540[c]	***
Relative forest income (RFI)	0.52[a]	0.33[a]	0.30[a]	0.27[a]	0.24	***
Relative cash forest income (RCFI)=TFCI/TCI	0.59[a]	0.55[ab]	0.60[a]	0.50[ab]	0.39[b]	**

Scheffe's test: means followed by a common superscripted letter imply the mean difference is not significant at the 5% level

* Weighted Inter-Bank Foreign Exchange Market Rate for the year 2007/08 is 9.2441 ETB/USD

The results show the important role that forest income plays in alleviating poverty and in reducing vulnerability to shocks. Forest income is also one of the main sources of cash income, improving the financial capabilities of households, particularly among the poorer households. The link between alleviation of poverty and forest management is clearly indicated which also implies the importance of sustainable forest management for people's livelihoods and, thus, the potential for involving the users themselves in the planning and management of the forest resource.

7.2 Paper II: Livelihood strategies and the role of forest income

This study aims at describing the livelihood strategies of households in the context of the participatory forest management arrangement. It identifies

livelihood strategies of households, examines household assets, diversification, livelihood outcomes and the role of forest income in different livelihood strategy groups. Livelihood strategies include the overall activities and choices that people make to achieve their livelihood goals. According to the sustainable livelihoods framework, households follow a combination of livelihood strategies taking into consideration the vulnerability context, the livelihood resources, and the prevailing institutional environment which together determine their capability for sustainable livelihoods. In contrast to the sectoral development approaches in the past, which used to view rural people as farmers or pastoralists and took an undifferentiated perspective, rural households are actually involved in diverse livelihood activities and strategies. According to Barrett et al (2001), households diversify their activities out of various motives, including risk reduction and reaction to crisis, in response to diminishing factor returns, to realize strategic complementarities between activities or to exploit the comparative advantages of technologies, skills or endowments. Therefore, any development effort to improve people's livelihoods should understand the factors that lie behind people's choice of livelihood strategy and then reinforce the positive aspects and mitigate the constraints (DFID, 1999). Co-management arrangements *inter alia* aim at improving people's access to natural assets (forest resources), thereby ensuring people's choice of livelihood strategies and improving livelihoods.

Using relative income values from different income sources, clusters of households were identified as livelihood strategy groups. The socioeconomic factors associated with the different livelihood strategies groups were determined using multinomial logit regression. Diversification of each livelihood strategy groups was also assessed. A field survey was conducted in the form of a group discussion to identify local people's perception of livelihood strategies and the important factors that determined their decisions to pursue different livelihood strategies. Livelihood strategy groups were then evaluated in terms of total income, poverty incidence and food security.

Five groups of livelihood strategies are identified – crop-based (41%), livestock-based (14.3%), forest-based (10%), business-based (6%) and households with diversified strategies (28.5%). Table 11 gives the income and other socioeconomic characteristics of the different strategy groups. Crop-based and business-based strategies are the most remunerative strategies. According to the group discussion, ownership of fertile land and access to market, respectively, are most important factors determining the two strategies. On the other hand, forest-based and diversified strategy groups consist mainly of low income households that are also more food insecure and have a higher incidence of poverty. These groups are also more dependent on forest income.

A higher level of diversification is observed both in lower income group and higher income groups (business-based strategy). However, the business-based strategy households have a higher income from small trades and a larger cash income than the lower income (diversified strategy) groups. The results of the multinomial regression show that households with forest-based livelihood strategies are more likely to be younger, have smaller cropland, and be closest to the town compared to households with crop-based livelihood strategies. Whereas business-based households share similar features, business-based households also have more livestock asset, earn a higher livestock income, and have a more diversified strategy.

Table 11. *Socioeconomic characteristics of livelihood strategy groups*[*]

	Strategy groups					ANOVA
	Diversified (n=96)	Forest (n=34)	Business (n=20)	Livestock (n=48)	Crop (n=138)	F-test[*]
Household size	7.0^{ab}	5.7^{a}	7.7^{ab}	8.3^{b}	7.5^{b}	**
Age of head	47.2^{a}	41.9^{ab}	35.4^{b}	51.4^{a}	47.7^{a}	**
Area of cropland (ha)	0.71^{a}	0.26^{a}	0.86^{ab}	1.33^{bc}	1.62^{c}	**
Value of physical asset (ETB)	490^{ab}	296^{a}	671^{ab}	587^{ab}	601^{b}	**
Altitude (m)	2796^{a}	2852^{a}	2760^{ab}	2737^{ab}	2653^{b}	***
Business income	3^{a}	1^{a}	752	0^{a}	11^{a}	***
Other income	25^{a}	9^{ab}	2^{ab}	2^{b}	8^{b}	**
Crop income	297^{a}	26^{a}	151^{a}	213^{a}	1121	***
Livestock income	374^{a}	267^{a}	486^{a}	887	451^{a}	***
Forest income	560^{a}	1168^{a}	788^{a}	194^{b}	304^{b}	***
Forest cash income	334^{a}	901^{b}	576^{ab}	82^{c}	131^{c}	***
Total cash income	479^{a}	975^{b}	1423^{b}	341^{a}	376^{a}	***
Total income	1343^{a}	1547^{ab}	2312^{b}	1387^{ab}	2002^{b}	**
Diversity index	1.94	1.43^{a}	2.41	1.55^{a}	1.56^{a}	***
Reasonably food secure	34%	12%	75%	33%	50%	
% under poverty line	42%	50%	20%	29%	19%	

Scheffe's test: means followed by a common superscripted letter imply the mean difference is not significant at the 5% level, NS = level of significance is < 5%; ** = Significant at 0.05, *** = Significant at 0.01

[*]All income values are in Ethiopian Birr (ETB)

Households with crop-based and business-based strategies have achieved relatively better livelihood outcomes in terms of income and food security. On the other hand, diversification appears to be associated with both better and inferior livelihoods outcome, thus indicating that both pull and push factors influence livelihood diversification. Access to fertile land is important for

pursuing the crop-based strategy. However, the co-management arrangement requires the areas of croplands to remain fixed at the current holdings. The more diversified business-based strategy relies to a considerable degree on forest and livestock income[5]. However, relatively fewer households pursue this strategy. Livestock strategy reflects the traditional way of life among the local people. According to the group discussion, this strategy is common among older households that are also not able to engage in the more labor demanding forest and agricultural production activities. Therefore, development initiatives focusing on the diversified and forest-based households have a higher potential for pro-poor impacts. Efforts towards improving market access, increasing the value of forest products through small scale enterprises and increased capacity of processing forest products could have a potential to improve livelihoods and alleviate poverty. Particularly the low income diversified strategy groups could also benefit from initiatives for more productive livestock and crop production.

7.3 Paper III: Factors associated with performance of user groups

In natural resource management, collective actions are needed to solve problems related to controlling resource use by potential beneficiaries and problems related to maintaining, producing and managing the resource (Ostrom, 1991). Collective action theories and extensive investigation of successful common property management of natural resources by local people have provided insight into prominent factors for successful collective action. Agrawal (2001) puts them in four major categories: i) attributes of the resource system, ii) attributes of the user group, ii) institutional arrangements, and iv) external environment. The purpose of this study is to assess the performance of user groups (WAJIBs) and explain the factors that are associated with the success of collective action in the participatory forest management. Its objectives are to identify and describe the conditions or variables that are associated with differences in the level of performance among different user groups in the PFM arrangement.

The institutional analysis and development framework (Ostrom et al., 1994) is used to identify and explain factors related to the performance of the user groups (WAJIBs) involved in the Dodola participatory forest management

[5] This is in comparison to crop-based and livestock-based strategies. Actually, households with the forest-based strategy are the most dependent on forest income both in total income (79%) and cash income (90%). Households with a business-based strategy get 35% and 39% of their total and cash income from forests, respectively.

arrangement. Assuming uniformity among user groups (WAJIBs) with regard to the design of the participatory arrangement, the external environment, and the general institutional framework, attention is given to factors related to user attributes and resource (forest and geographic) characteristics. Variables related to heterogeneity in socioeconomic factors, distance from town, social capital, age of user groups, size of user group and forests, and forest quality were therefore considered. The performance of WAJIBs was measured as a composite index comprising forest cover change, households' perception of the change in their livelihoods, households' satisfaction in their livelihoods, level of collective forest management activity and rent payment. The composite index of performance is expected to assess WAJIBs performance both in terms of conservation or management and impact on livelihoods.

On the basis of the performance index, the more successful user groups (WAJIBs) are those closer to the town, less heterogeneous in forest dependency and less dependent on forest income, located in low altitude areas and adjoining non-forest and non-user group areas (Table 12). A combination of reasons might explain this relationship including more accessibility to local experts' inspection, households' dependence on crop income, better awareness or perception of forest loss, and improved empowerment to ward off non-member intruders. On the other hand, other variables were also important when each measure of performance is considered. The performance measures can be split into two, as those related to collective forest management and those related to livelihoods impact. Accordingly, factors associated with better forest management or conservation include low initial tree cover, smaller forest area, smaller forest area/member, low level of trust, higher forest income inequality[6] and recently established WAJIBs. In terms of livelihoods' impact, WAJIBs who perceived positive changes in their livelihoods have less clan heterogeneity and high forest income inequality, and are recently established. In general, a higher level of initial forest degradation and lower level of dependence on forest products appear to be associated with better performance.

[6] Forest income inequality (heterogeneity) indicates differences in the amount of absolute forest income whereas heterogeneity in forest dependency shows differences in relative forest income (share of forest income of the total income).

Table 12. *Factors related to performance as measured by the performance index*

Variables	Performance class		ANOVA/Mann-Whitney test	
	low	High	Prob>F /Z/	
User group attributes				
Forest dependency heterogeneity	0.28	0.17	0.0148	**
Resource attributes				
Altitude (m)	2870	2612	0.0075	***
Exposure (% groups >25% exposure)*	0%	32%	0.000	***
Distance	12.8	9.1	0.0078	***(M-W)
User and Resource attributes				
Average forest dependence	37.8%	17.9%	0.0015	***
Average relative forest cash income	23.3%	8.1%	0.0065	***
Average number of livestock	10.7	12.6	0.0760	*(M-W)

*Pearson chi-square

*** = significant at 1%, ** = significant at 5%, * = significant at 10%, M-W = Mann-Whitney test

On the one hand, the association of lower heterogeneity in forest dependence and less dependence on forest income with better performance indicates that households value and are willing to protect and manage the forest within the current user right arrangement. On the other hand, however, it may indicate the need to take into account differences among local people in their dependence and the values attached to the forest by different groups. Conversely, heavier exploitation of the forest and greater dependence on the forest appear to associate with lower performance in collective action whereas heterogeneity in forest income (forest income inequality) is associated with better outcome. The corollary is that the forest resource is of sufficient value for local people to manage it collectively on a sustainable basis even if local people are not heavily dependent on the forest resource. However, wherever there are people that are significantly dependent on forest, the forest should supply enough to meet the needs of member households. This has relevance in the formation of forest user groups and the demarcation of forest blocks. The current practice of co-management arrangement and user group formation often involves giving user rights to relatively degraded forest resources without due regard to the amount and value of forest benefits actually available to member households, particularly the needs of the most dependent poor households. Besides, the demarcation of forest boundaries to user groups is based on a rigid allotment of fixed area per household, regardless of differences in the livelihood strategies

of member households. The results of the study suggest the need to consider the availability of sufficient forest resource that can adequately supply the needs of member households, and this is more important of course if there is a higher level of dependence on forest income.

7.4 Paper IV: Attitudes of local people towards collective action for forest management

Attitude is understood to be an important antecedent of people's behavior in relation to natural resources management or conservation; thus, many contemporary studies take up local people's attitudes as a major topic – mostly in relation to conservation projects or in the context of wildlife and nature reserve areas (Badola, 1998, Gillingham and Lee, 1999, Kideghesho et al., 2007, Lee et al., 2009, Mehta and Heinen, 2001, Mehta and Kellert, 1998). These studies share a common interest in exploring local people's attitude to conservation and developmental interventions by external agents, identifying sources of conflicts and proposing solutions in future management and policy decisions. In the context of community-based management, participants' understanding or perception of the purpose and the implication of the arrangement with respect to their interest, and thus the attitude they form, will influence the willingness and commitment for its implementation (Gelcich et al., 2005, Husain and Bhattacharya, 2004). However, studies on attitudes towards participation in collective forest management activities are limited in both the Ethiopian context and in a worldwide perspective. This study attempts to explain people's attitudes and the underlying perceptions that possibly influence engagement in the co-management scheme of the Dodola participatory forest management.

The study employs the theory of planned behavior (TPB). According to the TPB model (Ajzen, 1991), "people act in accordance with their intentions and perceptions of control over the behavior, while intentions in turn are influenced by attitudes toward the behavior, subjective norms, and perceptions of behavioral control." The theory postulates that underlying any behavior is information, or beliefs, that are relevant to the behavior. Accordingly, there are three kinds of beliefs corresponding to the three predictors in the TPB model that basically explain behavior – behavioral beliefs, normative beliefs and control beliefs. Self-identify is also included, in addition to the TPB variables. Self-identity was used as an extension to TPB to broaden the social factors captured (Conner and Armitage, 1998). It is defined as the salient part of an actor's self that relates to a particular behavior or reflects the extent to which

an actor sees himself or herself as fulfilling the criteria for any societal role (ibid). Engagement in forest management activities, specifically intention to participate in planting activities, was chosen as the behavior against which attitude of local people towards the participatory management is assessed. Planting is considered appropriate as it relates directly to the regeneration of the forest and implies the sustainability of the forest and the viability of the participatory management. All the predictor variables in the TPB – attitude, subjective norm, and PBC – can be measured directly or indirectly (belief-based method) by asking respondents to judge each variable on a set of scales (Ajzen, 2002). In the direct method, a set of statements (items) is used to directly measure each of these variables. In the indirect method, beliefs that are assumed to underlie each of the variables together with the strength of these beliefs are used to compute the mean value of each variable.

The results show that most households intend to participate in the planting activity. All of the variables theoretically assumed to influence intention are important and positively influence intention to participate in planting. The results also show that both TPB models based on the directly (Table 13) and indirectly measured variables have the potential to predict intention to participate in planting accounting for 48% and 37% of the variation, respectively. The relation of salient beliefs to attitudes and intention is indicated in Table 14. Accordingly, households consider planting an important management activity that would ensure the availability of forest products and services on a sustainable basis. Moreover, the indirect benefits of planting by enabling the use of old and over-mature trees and through a reduction of annual rent payment are well appreciated by the respondents. While households are confident enough in their ability to carry out planting, they also perceive the difficulty of ensuring positive outcomes owing to destruction by wild animals. However, most households do not consider planting to be a successful operation owing to the low survival rate of seedlings. Households also associate the low survival rate with the use of naturally regenerating seedlings (wildings) instead of nursery grown seedlings. Moreover, about 90% of households see themselves as conscientious in terms of the benefit of the community, the environment, and the sustainable management of the forest for future use. With regard to socioeconomic characteristics, households more dependent on crop income, with larger farmlands, higher education level and better physical assets, appear to have a positive attitude and intention to participate in the planting activity. On the other hand, negative attitude and intention are associated with households that are headed by females and households that are more dependent on forest income.

Table 13. *Factors influencing intention to participate in the planting activity (direct TPB variables)*

	Coef.	Std. Err.	t	P>t
Attitude	0.355191	0.098966	3.59	0.000
Perceived behavioral control	0.282285	0.054789	5.15	0.000
Subjective norm	0.219991	0.063104	3.49	0.001
Self-identity	0.218841	0.05018	4.36	0.000
_cons	-3.14591	0.337861	-9.31	0.000

N = 349, F(4, 344) = 82.36, Prob > F = 0.0000, R^2= 0.4892, Adj R^2= 0.4833 , Root MSE = 0.56274

Table 14. *Correlation and regression values of intention over self-identity and salient beliefs of attitude, PBC and subjective norm*

	Correlation		Regression	
	Coef.	P>t	Coef.	P>t
Planting is supported by close families in the same WAJIB	0.1603***	0.003	-0.0038	0.476
Planting is supported by close families outside WAJIB	0.1374***	0.010	-0.0029	0.588
Planting is supported by elderly whom I respect	0.2338***	0.000	0.0145**	0.015
Planting is supported by neighbors and friends	0.1477***	0.006	0.0028	0.661
The role of planting in maintaining attractive landscape	0.2143***	0.000	-0.0005	0.954
Planting as a successful forest management activity	-0.0682	0.204	-0.0068	0.266
Planting as an operation to sustain forest products and services	0.2382***	0.000	0.0032	0.731
Planting to maintain the forest and its benefits to the next generation	0.2708***	0.000	0.0063	0.429
The opportunity to use old trees and replace them by planting	0.2064***	0.000	0.0059	0.361
The role of planting in increasing forest area and reducing forest rent	0.3863***	0.000	0.0209***	0.000
Conversion of open grazing area to forest by planting	-0.0228	0.671	0.0004	0.928
Having the knowledge and skills for planting activity	0.4269***	0.000	0.0314***	0.000
Having the time and labor to participate in planting activity	-0.0011	0.984	0.0016	0.808
Controlling the impact of wildlife on survival of seedlings	-0.1777***	0.001	-0.0080**	0.057
Controlling the impact of livestock on survival of seedlings	-0.0256	0.634	0.0051	0.251
Controlling the survival of seedlings planted on communal land	-0.0433	0.422	-0.0025	0.613
Self identity	0.5528	0.000	0.3786***	0.000
Constant			-0.8219	0.009

N= 345, F (17, 327) = 16.20, Prob > F = 0.000, R^2 = 0.4572, Adj R^2 = 0.4290, Root MSE = 0.59083
***significant at 1%, ** significant at 5%, *significant at 10%

The elicitation of households' perceptions and attitudes towards the tree planting activity revealed a diversity of issues among local people and the need to consider participants perspective in consolidating the participatory management scheme. For instance, the rent payment arrangement has worked as a positive incentive whereas the 'inefficient' planting technique has negatively influenced attitudes towards participating in tree planting. The finding emphasized that successful implementation of the co-management arrangement requires a continuous exchange of ideas and information between user groups and the government counterparts that provide technical support and advice. There are still conflicting interests among the participant households, and these are important for the viability of the arrangement. Establishing the desirable behavior of households for the sustainability of the participatory management requires understanding the local households in the perspective of the PFM impacts on different socioeconomic groups in the local community.

8 Concluding Remarks

8.1 Scientific implications of the research

The sustainable livelihoods framework provided an appropriate analytic framework for conceptualizing the relationship between forest resource, people's livelihoods and poverty. The forest resource at Dodola area is shown to be an important constituent of the natural capital available to the local people. Forest productive activities and forest income are important components of households' livelihood strategies, and their consideration in development initiatives cannot be overemphasized. Forest income plays a role in alleviating poverty, filling seasonal income gaps and coping with income crisis, particularly in the poorer households. Better off (high income) households have a higher forest income than poorer (low income) households. On the other hand, low income households are more dependent on forest income. Higher value products particularly timber is extracted mainly by higher income groups.

There are distinct livelihood strategy groups with varying levels of income, food security and forest dependence. Beyond the traditional agricultural activities (crop and livestock production), about half of the households (49%) pursue diversified, business-based or forest-based livelihood strategies. Despite differences in the role of forest income in the different strategies, forest income contributes significantly in all types of livelihood strategies. The more diversified households were relatively more food secure and had a higher forest income in their income portfolio. The results emphasized the importance of the forest resource in shaping people's livelihood strategy and diversification decisions. Although livelihood diversification is seen in all groups, the highest level of diversification is observed both in the low income and high income groups. This indicates that both risk reduction or safety concerns (push factors) and wealth accumulation (pull factors) are important in determining

diversification. Differences in livelihood strategies are explained by access to livelihood assets including natural and human capital and access to market. Traditional lifestyle was also important in influencing the strategy decisions of some households.

Even if the context is characterized by an externally initiated and mediated participatory management arrangement, the outcome of collective management is related to both the socioeconomic characteristics of user groups and the characteristics of the forest resource. Distance from the market, level of forest dependence and heterogeneity in forest dependence are negatively correlated with user group performance. On the other hand, a high level of exposure to external intrusion is found to be positively correlated to performance. The extent of forest degradation, the size of the forest, and the age of the user groups however also show a correlation with user group performance when each measure of performance is considered separately.

With regard to the perceptions and attitudes of member households, on the one hand, a positive appreciation of the value of the forest resource, positive attitudes towards engaging in collective management activities and the intention to contribute to the sustainable management of the forest resource are observed. On the other hand, there is a relatively lower level of appreciation in livelihoods' improvement following the participatory forest management scheme. Nevertheless, the effect of participatory management on households' livelihoods was found to be more important in shaping members' attitudes and intentions. Forest dependent and livestock-based households are observed to be more sensitive to the impacts of the new arrangement and to have less favorable attitudes towards participating in planting activities than crop-based households.

8.2 Practical implications of the research

Forest income assumes a major means of living, a supplementary and regular income source, major source of cash income, a gap-filler during seasons of shortage, and a source of income to cope with income crisis. However, the special role that forest income plays in the most vulnerable and poorest groups cannot be overemphasized. In addition, the distinct livelihood strategies and diversification observed show a major departure from the notion of the cereal farming systems used to describe the rural livelihoods in the locality. It is also a reminder of the importance of forest ecosystems in shaping people's livelihoods and the need to distinctively consider pockets of forest areas in planning development and conservation initiatives. There is thus sufficient indication that local people are the most important stakeholders in the

management of the forest resource. It can also safely be assumed that the sustainability of the forest resource and the institutional arrangement for its equitable access will be in the interest of the local people. Equally important issues are the heterogeneity among members of forest user groups in livelihood strategies, differences in livelihoods outcomes, and differences in the importance of forest income. These differences need to be taken into consideration in all efforts of to alleviate poverty and interventions for sustainable management of the forest resource.

As Ellis (1998) indicated, the capability to diversify income sources signifies an improvement in the livelihood security and income increasing capabilities of the rural households in general and it is critical for the survival capabilities of the rural poor. This explains why many researchers regard rural diversification as an important goal of development policy (ibid). In this regard, the forest resource has proved to be a critical asset – a temporally stable source of income and a major source of cash income with particular importance for the poorest section of the community. While relieving financial or credit constraints, forest income has also served as a major means of income diversification with a substantial income-equalizing effect among households. Forest resources are thus important components (assets) in the diversification strategy of the rural poor. The risk-reduction and cash-generating role of forest incomes, particularly among the most vulnerable groups, must therefore be given proper attention in planning development policies in similar contexts. Conservation and management interventions need not compromise the pro-poor forest production activities.

In view of the compromises that must be made by the local people and the government when changing from a de facto open access situation to a participatory arrangement, there will evidently be costs to the local people in terms of a reduction in forest income, payment of rent, and costs for forest protection that impact member households differentially. In agreement with this, the findings indicate that the less forest dependent user groups and the more degraded forest areas have shown better performance. On the other hand, the more forest dependent user groups and the groups that are more heterogeneous in terms of forest dependency have shown a lower level of performance. One important implication in participatory management is that the degree of forest dependence matters only if it can be matched with the availability of sufficient forest resource to supply the needs of member households that are dependent on the forest. The fixed-forest-area-per-member allocation rule in the demarcation of forest blocks might therefore not be the optimal way to achieve equitable and successful collective management. On the other hand, institutional design providing for continued negotiation and

adaptation of rules of benefit-cost sharing among member households can be a good way to lessen the impacts of heterogeneous interests. The problem of the gap in forest supply and demand can be alleviated by increasing the value of forest products. This may also have multiple effects through a creation of employment to the youth, expansion of services and activities in other local trades.

The major implications of the research are:

- In parallel with previous findings (Ellis, 2000, Reardon et al, 2006) non-farm activities are significantly important in the livelihoods of local households. The forest ecosystem has profound effect in shaping livelihoods.
- There are diverse patterns of forest use and heterogeneous interests; and there are thus differential impacts in introducing a new institution to access the resources of the forest.
- Initiatives for alleviating poverty and improving livelihoods must consider the diverse livelihood strategies of local people and recognize the importance of both farm and non-farm activities.
- Forest management and conservation initiatives should consider peoples' livelihoods as an integral component as local people have a crucial stake in the sustainable management of the resource and as this can be safely assumed to be their priority.
- The participation of local people is important, not only because of the higher stake of local people in the management of the forest resource but also in the perspective of considering multiple interests of households, which necessitates firsthand knowledge, transparent decision making and opportunities to negotiate and accommodate multiple interests in decision making.

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