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## Local people dependency and stakeholder's involvement for sustainable management of Chilmo forest

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### ABSTRACT

Site and situation specific assessments of ecosystem services are crucial to sustainably conserve and manage the Chilmo forest. In this specific study, an attempt has been made to identify how local communities depend on Ecosystem services and on other stakeholders involved in sustainable forest management. The study triangulated primary data collection methods such as field observations, household surveys and key informant interviews. Secondary data was also used to support and verify the primary data. SPSS version 20 software and Microsoft excel were then applied to describe the socioeconomic characteristics of the study population's households. Data collected through discussions and observations was analyzed qualitatively. Four forest ecosystem services (provisioning, regulating, habitat and cultural services) were identified in the study area. Even though agriculture is the main economic activities, sample respondents earn money from diverse sources such as from homestead, wood lots, honey production, petty trade and from the selling of timber and non -timber forest products, from forest dividends and other forest related employment. Chilmo forest, on average, contributes more than a third of total annual income of the sample households. Surprisingly, almost all sample respondents participate in fuel wood collection, both for household consumption and market. Similarly, fuel wood collection generates the highest income, compared to other activities, because fuel wood is the sole source of energy in the study area. Therefore, provisioning services are the main source of livelihood and subsistence incomes for local communities. The findings greatly contribute towards the management of the Chilmo forest and will be used as input for further valuation work.

**Keywords:** Ecosystem service, Valuation, Forest, Ethiopia, Chilmo forest

## **1. INTRODUCTION**

Ecosystem services are defined as the direct and indirect contributions of ecosystems to human well-being (de Groot et al., 2010). In literature, much attention is given to enhance sustainable management of natural resources and their associated ecosystem services (Daily, 1997). However, land use change has a considerable impact on the world's ecosystems. Despite forest being known to be significant to the delivery of ecosystem services, they are one of the most threatened ecosystems worldwide.

In East Africa, particularly in Ethiopia, loss of ecosystem services caused by the removal of trees is a major problem for the environment and economic development of the country (Kindu et al., 2016). Although consistent statistics are not established, a number of scholars estimate deforestation rate at 160,000 to 200,000 ha/year (Badege, 2001). Because of the alarming rate of deforestation, the forest area coverage of Ethiopia dramatically decreased to 4% compared to 30% at the end of 19<sup>th</sup> century (Badege, 2001). However, due to large scale reforestation program and massive planting campaigns the forest area coverage has been increased. Currently over 100 million peoples are living in Ethiopia from which 80% live in the countryside (UN department for economic and social affairs 2015) and most of them are highly dependent on forest ecosystem services.

Assessing and being aware of benefit of ecosystem service is essential to understand the importance of ecosystem services for human wellbeing and for sustainable management of the ecosystem (Costanza et al., 2014). Furthermore, information about ecosystem services is important for decision makers to understand the dependency of local communities on ecosystem services, to incorporate perceptions of stakeholder and to come up with better land use policy (Forster et al., 2015).

Over the last 50 years, the forest management strategy in Ethiopia has negatively affected the forest by hindering local people's access and use right of resources which leads to further devastation of forest resources (Tagesse and Wossen, 2015). Similar to many parts of Ethiopia, Chilmo forest was one of the most exploited forests in the country. Ineffective centralized forest management, frequent political change and associated shift of property rights coupled with unsustainable use of natural resources and land use change led to forest degradation and deforestation (Negassa and Wiersum, 2006).

A number of efforts have been done to minimize the rate of deforestation and associated ecosystem services such as reforestation and afforestation by different development initiatives projects but they were not successful because they didn't incorporate private incentives and no participation of local communities. However, in 1996, to minimize the rate of deforestation in Chilmo forest, Farm Africa and the government of Ethiopia (Forestry department) initiated Participatory forest management schemes (PMFS). In sharp contrast to a top down approach of forest governance, PFM gives priority and consideration to local communities as a primary stake in conserving and managing the forest. The PFM project result confirms that in order to protect the forest in sustainable way it is good to allow local communities to use provisioning services such as proper production and marketing of non timber forest product (NTFP) as an alternative source of income which leads eventually to shift toward more forest friendly livelihood activities which enhances forest's productivity.

Although the poorer households heavily dependent on forest resources (Tagesse and Wossen, 2015), there is a lack of knowledge about the degree of dependency of local communities on forest ecosystem services in this specific area which is crucial to understand

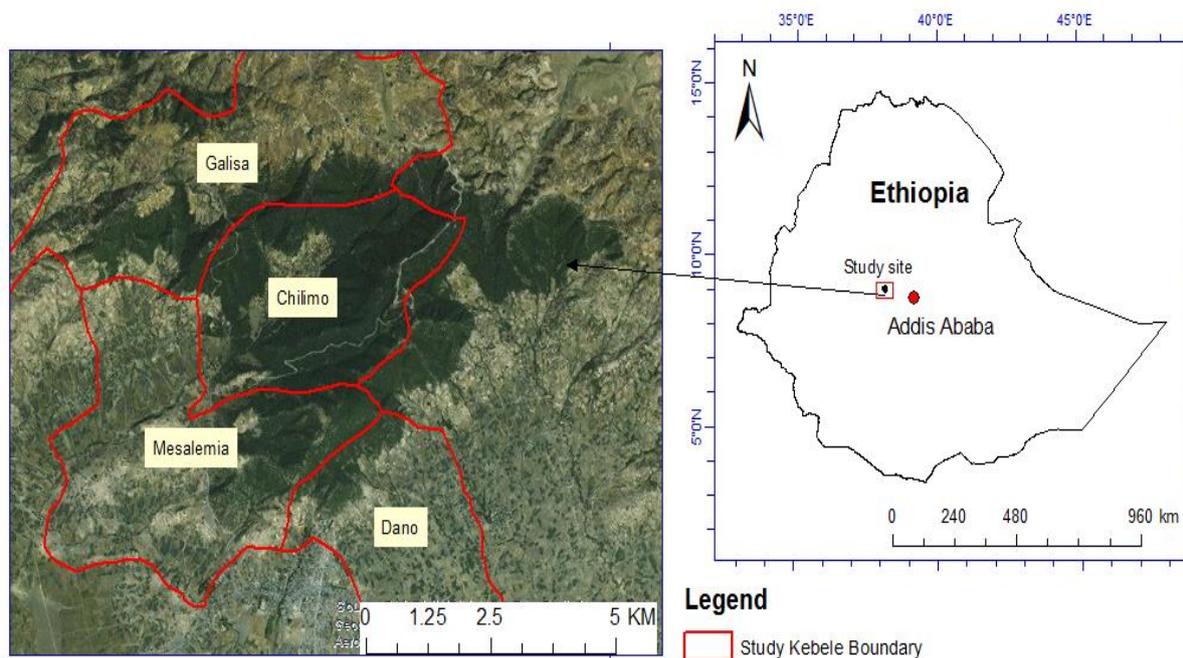
the importance of the forest for supporting local peoples livelihood and the willingness of local communities to take responsibilities to participate and cooperate in collective action for sustainable conservation and management of Chilmo forest (Tagesse and Wossen, 2015). Understanding degree of dependence of local communities on ecosystem services helps to find alternative sources of income/livelihood support from complementary livelihood intervention such as carbon trade, REDD+, credit for apiculture, fattening, and petty trade. Since sustainability of ecosystem services cannot be achieved unless diversification of livelihood is put in place, especially for the most deprived local people and for women. In addition lack of knowledge about the preference of local community on the type of incentives is another factor which may decrease the motivation of local communities to respond to long lasting environmental problems like deforestation (Patterson and Coelho, 2009). Moreover, identifying the main stakeholders who depend directly and indirectly on Chilmo forest is crucial to analyze the management of forest in a more holistic way and find a sustainable solution for conflict of interest between stakeholders (Cohen-Shacham et al ., 2015).

## **2. MATERIALS AND METHODS**

### **2. 1. Study area description**

Chilmo forest is one of the few remnants of dry afro-montane forest located in Dendi District, western Shewa zone, Oromia regional state, Ethiopia. Chilmo Forest is found 70 km west of Addis Ababa, capital city. Chilimo Gaji Forest belongs to Dry Afro-montane forest type (Tamrat Bekele 1994; Friis 1992). The forest is situated between altitudinal range of 2,170-3,054 m above sea level and geographically positioned at 38° 07' E to 38° 10' E and 9° 30' to 9° 50' N' longitude (Soromessa and Kelbessa, 2014). The rainfall in Chilmo forest and the surrounding area is belonging to type I rainfall regimes which receives rainfall for five months per year and extending from May- Sep. The rainfall reaches peak on July (Soromessa and Kelbessa, 2014). Currently Chilimo forest is owned by 8 Forest cooperatives and 4 Forest users Group. Over 2858 households, 15,000 people (total population) live inside or surrounding the forest (Tagesse and Wossen, 2015). Surprisingly, Chilmo forest is the place where one of the longest rivers (Awash River) originates and also it is the home of over 180 species of birds and 21 species of mammals. Some of the endemic sub species of mammals include Colobus Monkey, Meneliks bushbuck, Anubis baboon, leopard and Vervet monkey. Furthermore, Chilmo forest is rich in diversity of broad-leaved tree species mainly *Olinia rochetiana*, *Allophylus abyssinicus*, *Juniperus procera*, *cuspidata*, *Podocarpus falcatus*, *Rhus glutinosa*, *Olea europaea ssp*, *Scolopia theifolia*.

Soromessa and Kelbessa, 2014 also investigate 213 plant species which are categorized into 83 families. Surprisingly, 17 of them are endemic tree species. *Maytenus gracilipes* species score the maximum density 258.7 stems per hectare followed by *Podocarpus falcatus* (120 individual per hectare) and *Scolopia theifolia* (109.3/ha) (Soromessa and Kelbessa, 2014 ). In addition to the natural forest species in plantation forest include *Hagenia abyssinica*, *Podocarpus falcatus*, *Eucalyptus saligna*, *Eucalyptus camaldulensis*, *Juniperus procera*, *Cupressus lusitanica*.



**Figure 1.** Map of the study area

Source: Satellite Imagery from ESRI, Dark green is the Chilmo forest and the rest is other land use types.

## 2. 2. Population characteristics of the study area

Chilmo Gaji forest is surrounded by seven peasant association. The original settlers in the area are Oromos, but during the last century few ethnic groups belonging to Gurage, Amahara and kembata have settled in the area (Soromessa and Kelbessa, 2014). Most of the new settlers are descendent of the saw mill workers and forest laborers. Even though, agriculture is the main occupation of the community, forestry also has considerable contribution for household livelihood.

## 2. 3. Data source and Methodology

The study had employed triangulation of primary data collection methods such as household survey, key informant interview, field observation used in system analysis was implemented to retrieve the required data. In addition, secondary data was used to back up the primary data.

### 2. 3. 1. Sampling Procedure

Sampling procedure for selection of forest cooperatives was carried out using purposive sampling techniques. Purposive sampling was used to select 4 forest cooperatives from 8 forest cooperatives-based on position in the watershed (lower to upper catchment), condition of forest (highly managed to the disturbed forest), accessibility for field work, dependence of local people. According to this criteria four forest cooperatives namely Chilmo, Mesalemia, Gallessa and Dano Sengote were selected. Selection of household respondents was carried out using

simple random sampling techniques. First, we got the sampling frame from each forest cooperatives mainly name of household head, then we selected 25 respondent sample households from each forest cooperatives using lottery system. All the selected respondents for this specific study were the head of the household. The sample size of the household survey for each cooperative was 13-20% of each total household since number of households in each cooperative varied. A total of 100 household head were participated for the household survey.

1) Household survey

Semi structured questioner was used to answer the research questions. Before starting household survey, we were pre-testing the questioner and we made minor correction. A total of 100 household head were participated for the survey. Number of sample household in each forest cooperative was 25. Prior to asking the questions the purpose of the household survey was briefly explained for selected household survey respondents. Primary data from the sample respondent include general information of the respondent household such as name, age, sex, marital status, wealth class educational status, number of family members, landholding size etc), were included in addition to the key questions related to specific objectives/questions.

2) Key informant interview

Checklists and semi structured questioner were prepared for the key informant interview to get more in-depth data about forest ecosystem services. Furthermore attention were given during selection of participant such as number of years they lived in the area, firsthand knowledge of the area (Those who know better about the area), traditionally and culturally respected elders to answer questions related to historical background and cultural value of the forest. We interviewed one key informant from each forest cooperatives due to lack of time and other security issues in the study area.

### **2. 3. 2. Data analysis and management**

SPSS version 20 software and Microsoft excel were employed to describe socioeconomic characteristics of households. The analysis was used descriptive statistics mainly frequency, descriptive, bar chart, cross tabulation pie charts and histogram. Data collected through key informant interview and field observations was analyzed qualitatively.

## **3. RESULT**

### **3. 1. Dependency of local communities on Ecosystem services**

#### **3. 1. 1. Sources of household income**

Agriculture is the main occupation in the study area and the main source of livelihood for most of the sample households and for the local people in general. Agriculture includes both crop and animal production. Each family member is involved in farming practice starting from land preparation until harvesting and storage. The type of land farmers possesses differ one from the other depend on number of years stayed in the area, wealth status, family size and availability of sufficient land in the area. However, the average size of agricultural land, homestead, woodlots, grazing in ha is 1.0, 0.28, 0.16 and 0.48 hectare respectively. Even though agriculture is the main economic activities sample respondents earn money from diverse sources such as from, homestead, wood lots, honey production, petty trade, and wage and from

selling of timber and non -timber forest products, dividend from forest and other forest related employment.

**Table 1.** Source of income for surveyed sample households.

<b>Income from the forest</b>	<b>N</b>	<b>Average annual income earned in Ethiopia Birr</b>	<b>Income from none forest activities</b>	<b>N</b>	<b>Average annual income earned in Ethiopia Birr</b>
<b>Fire wood collection</b>	93	3219	Crop	79	8195
<b>Farm implement</b>	86	309	Livestock	73	3704
<b>Fencing wood</b>	76	833	Homestead	68	1589
<b>Construction wood</b>	42	1563	Petty trade	25	616
<b>Grass collection</b>	34	323	Honey	25	228
<b>Dividend</b>	89	2872	Seedling	6	100
<b>Forest honey</b>	11	147	Other	1	100
<b>Tree seed</b>	6	54.00			
<b>Forest related employment</b>	3	100			
<b>Total income</b>		<b>9418</b>			<b>14532</b>

According to the data the average annual income of the surveyed sample household is 25,000 Ethiopian Birr (ETB). The income is calculated based on their responses in the household survey and it includes all the money they earn from the above activities. The income from the forest is calculated by converting wood products collected freely from the forest into monetary terms. The forest constitutes 36% sample household annual income.

The second most important source of income is crop production which constitutes 31% of annual income followed by livestock production (14%). Annual income from homestead and woodlot is 6% and 8 respectively. The remaining 20% of the sample household annual income is coming from petty trade, wage, seedling and bee keeping.

### **3. 2. Income and participation rate from forest related activities**

Chilmo forest on the average contributes 36% of the total annual income of the sample household. Local communities are highly dependent on natural resources for a number of reasons. They collect food such as wild fruit and herbs for household consumption and they fulfill high demand of wood and non-wood products from forest. In general, the source of forest

income is mainly from fuel wood, construction wood, dividend, fencing and from collection of grass. Surprisingly, 93% of the sample respondents participate in fuel wood collection both for household consumption and market. Similarly fuel wood collection constitutes the highest income compared to other activities because fuel wood is the sole source of energy in the study area. They earn an average annual income of 3219 ETB from fuel wood. The second largest income from forest resource is from dividends which are based on number of shares purchased from cooperatives. But this benefit is not always in yearly bases unless the forest cooperative has plantation forest which can be harvested every year. Based on this research Chilmo forest cooperatives are highly beneficial because they sell wood and the amount of money distributed for each member is better than other cooperatives. According to the data, the average amount of money from dividend per year is around 2872 ETB. Members who have more share would receive more money. On the other hand, members from Dano Sangota forest cooperative collect low amount of money from dividend because the forest around them is highly degraded in the previous time as a result they don't have enough trees for harvesting.

Moreover, from our results considerable number of sample household also participate in preparing farm implement (86%) and in collection of wood for fencing (76%). The participation rate for wild fruit collection is 77%, however its contribution for household income is unknown since wild fruits have no market price in this specific study area. On the other hand, almost equal number of households participates for activities such as collection of medicinal plants and grasses (35%) and they earned 323 ETB from grass collection but since medicinal plants have no market price it is not possible to include the value into monetary terms. Even though the participation rate is very low for collection of construction wood they obtained remarkable amount of average annual income of 1563.00 ETB which is better than the previous two activities. The contribution of forest related employment is very low because most of the sample households work without payment. Therefore, from this study we concluded that high participation in low return forest activities such as fuel collection leads to high income but the participation rate for high return forest activities is very low because it is not allowed for anybody to cut and use wood for construction unless they have permission from forest cooperatives.

**Table 2.** Participation rate and forest income per activity.

<b>Activities</b>	<b>Participation rate In percent</b>	<b>Average Annual income earned In Ethiopia Birr(ETB</b>
Fire wood collection	93	3219
Farm implement	86	309
Collection of wild fruit	77	0
Cutting of wood for fencing	76	833
Wood for construction	42	1563
Use of Medicinal plant	35	0

Grass collection	34	323
Harvesting honey	11	147
Tree seed collection	6	54.00
Other forest related employment	3	100
<b>Total income from forest</b>		9418

The participation of local people in different forest related activity is determined by number of male and female members, farm size, type of land, source of income, condition and distance from forest to market. The probability of participating in forest related activity is very low if the local people has larger farm size, alternative income (petty trade) and owns different type of land. Household who has more female family member participate more in fuel wood collection than farmers who has male family member. Because in Ethiopia 90% of firewood collection are undertaken by women (18-59 age) assisted by female children whose age ranging from 6-17-year-old. Male children with the same age are also involved in fuel wood collection (Gwavuya et al., 2012). But it is not true for other activities. Therefore; the greater the number of male household members, the higher would be the rate of household participated in high return forest activities such as harvesting of construction wood and farm implement.

**Table 3.** Participation rate of family member per each activity.

Activities	Wife	Children	Husband	Wife& Children	Husband & children	Wife & husband	Not participated	Participation rate
Fuel wood	42	20	4	25	0	2	7	93
Farm implement	3	-	83	-	-	-	14	86
wild fruit	-	74	3	-	-	-	23	77
Fencing	-	3	72	-	1	-	24	76
construction	2	-	40	-	-	-	58	42
medicinal plant	6	-	29	-	-	-	65	35
Grass	-	3	30	-	1	-	66	34
Honey	-	-	11	-	-	-	88	11
Tree seed	-	-	6	-	-	-	96	6
Forest related employment	-	-	3	-	-	-	97	3

### **3. 3. Role of stakeholders in management of Chilmo forest**

#### **3. 3. 1 Stakeholder analysis**

Currently stakeholder analysis becomes popular in number of governmental and nongovernmental organizations especially for natural resource management (Reed et al., 2009). Stakeholder analysis is defined by many authors. According to Hein et al., 2006, stakeholder analysis is defined as understanding group or individual who can affect or is affected by ecosystem services. The analysis is very significant for stakeholder involvement and sustainable management of Chilmo forest. In addition, stakeholder analysis is beneficial to evaluate different perspectives of stakeholders involved in the area and also to understand the level of dependence on specific services (Hein et al., 2006; Abson and Hanspach 2014).

In this study stakeholder analysis was done based on three steps. Firstly, we tried to identify key stakeholders who are involved in conservation and management of Chilmo forest based on their interest and influence regarding to Chilmo forest. Secondly, we prioritized and weighed them as primary, secondary and tertiary using stakeholder influence matrix. Thirdly, we assessed relative stakeholder management capacity and commitment regard to Chilmo forest ecosystem. Primary data and secondary data collection methods will be employed to identify main stakeholders in the area.

##### **3. 3. 1. 1. Identification of the main stakeholder**

Stakeholders in the study area can be both the people with power to control the use of resources, and those with no influence but whose livelihoods are affected by changing the use of resources. Though this stakeholder analysis we identified stakeholders and an understanding of their role and influence in the conservation and management of Chilmo forest. The identification of the stakeholders was based on personal interview and secondary data.

**Primary Stakeholder:** Stakeholder included in this group is a stakeholder who significantly dependent up on the services provided by Chilmo forest. Local communities found around the forest are the primarily stakeholder in which their livelihood is highly depend on number of the services provided by Chilmo forest.

**Secondary Stakeholder:** a Stakeholder included in this group is stakeholders who are not primary dependent on Chilmo forest ecosystem services but still loss ecosystem services. Downstream farmer's is highly influenced by mismanagement of Chilmo watershed. However they don't have influence for decision making process.

**Tertiary (external) stakeholder:** a stakeholder whose action can affect sustainable conservation and management of Chilmo forest but do not loss or gain ecosystem services. The stakeholder included in this section includes local, regional and national government, Oromia forest and wildlife enterprise, tourists, scientists, Nongovernmental organization.

##### **3. 3. 1. 2. Description of the main stakeholder**

###### **1) Local communities**

Local communities are one of the stakeholders who depend on the forest ecosystem for their livelihoods through different activities such as harvesting of non-timber forest products such as wild fruit, honey and firewood. In addition the forest is the source of wood products for construction, charcoal making, farm implement, fencing etc. Furthermore the forest is a source

of income for a household for example from firewood and sharing of dividends. The forest watershed is a place where number of small streams and rivers originates which is a water source for drinking and irrigation purpose. Therefore, they have interest in protecting the forest for access and utilization of different ecosystem services. Since the locals have very in-depth knowledge of their environment, a higher level of local participation is crucial for more effective forest protection. It is important to recognize that people's interests in a particular forest area often include other aspects than just economic values. Forests have educational/ecotourism recreational or aesthetic values. Depending on how they feel towards conservation activities, different stakeholders may want to participate in different ways (Isager & Theilade, 2001). Interestingly when we asked about the future preferences of the local people of the study area 100 % of the survey household respondents need to see Chilmo forest as managed forest. The local community makes up an important group of stakeholders because of their high interest in the conservation and management of Chilmo forest. However, the group is considered to have low influence in the actual decision making process.

## **2) Local government**

The local government (Woreda administration offices, Woreda agriculture and Natural resource offices, Woreda land use and planning unit) plays a major role in the natural resource management through promoting sustainability of community conservation programs and building local support for enforcement of rules and regulation. Their main interest is to encourage and facilitate different conservation programs, together with raising awareness on the importance of conserving forest. Thus, the local government has higher interest in multifunctional use of the forest. However; they have medium influence because they have medium decision-making power on the conservation and management of Chilmo forest.

## **3) Regional government**

Regional government such as Bureau of agricultural and rural development ,Bureau of water, irrigation and energy and Bureau of environmental protection are stakeholders who are not directly depend on the ecosystem services delivered by Chilmo forest but they have a mandate to impose access of restriction on the natural forest. However they have high decision power.

## **4) Oromia forest and wildlife enterprise**

Oromia forest and wildlife enterprise has a mandate to administer and sustainably manage Chilmo forests .So the enterprise has high interest in the conservation and management of Chilmo forest .They give technical support for the forest cooperatives during inventory, promotion, market. In addition they receive 30 % of the money from the forest cooperatives coming from selling of wood. However they use the money for capacity building, technical support and for development of infrastructure for the local communities .Similarly they have high decision making power compared to others.

## **5) National government**

The National government (Ministry of environment and forestry (MEF), Ethiopian Biodiversity Institute (EBI), Ethiopian wildlife conservation authority (EWCA), Ministry of Agriculture (MA) have a mandate for conservation and management of Chilmo forest. Therefore, the national government has high interest in conservation of the Chilmo forest ecosystem. Moreover, they have high influence because they have decision-making power.

## **6) Tourist**

Tourists have high interest in the conservation and management of Chilmo forest .But because of low awareness creation, absence of sufficient facilities such as hotel around the forest, the number of tourists are very low in number. Though tourists do not have high influence when it comes to the decision-making process, they would value the sustainable conservation and management of the forest which creates an increased tourism market.

## **7) Nongovernmental organization (Farm Africa)**

NGOs are mostly involved in sustainable management of natural resources. Since 1996 Farm Africa implemented number of activities to improve the livelihood of the local people. They established nursery site near to the natural forest and raise number of seedlings for small scale plantation to satisfy high demand of wood and at the same time to minimize the pressure on the natural forest. In addition they create forest related job opportunities for local people. Therefore, they have high interest in the conservation and management of the forest .but they have very low influence when it comes to decisions about the forest itself.



**Figure 2.** Tree nursery established by farm Africa

## **8) Scientists from research organization/universities**

Scientists are stakeholders because they are involved in research projects to pursue scientific knowledge and increase public knowledge about the forest by providing their research findings to the users and decision makers. Scientists initiating research projects for example, Agroforestry for livelihood improvement and Natural resource management helps to reduce the pressure on natural forest by creating alternative income for local people through promotion of market-oriented fruit tree species like apple. In addition, scientists upgrade the knowledge of local communities by creating awareness, training and education.

## **9) Wood industry**

The use of ecosystem services is not determined for this external stakeholder. But the wood industry has strong negative impact for conservation and management of Chilmo forest

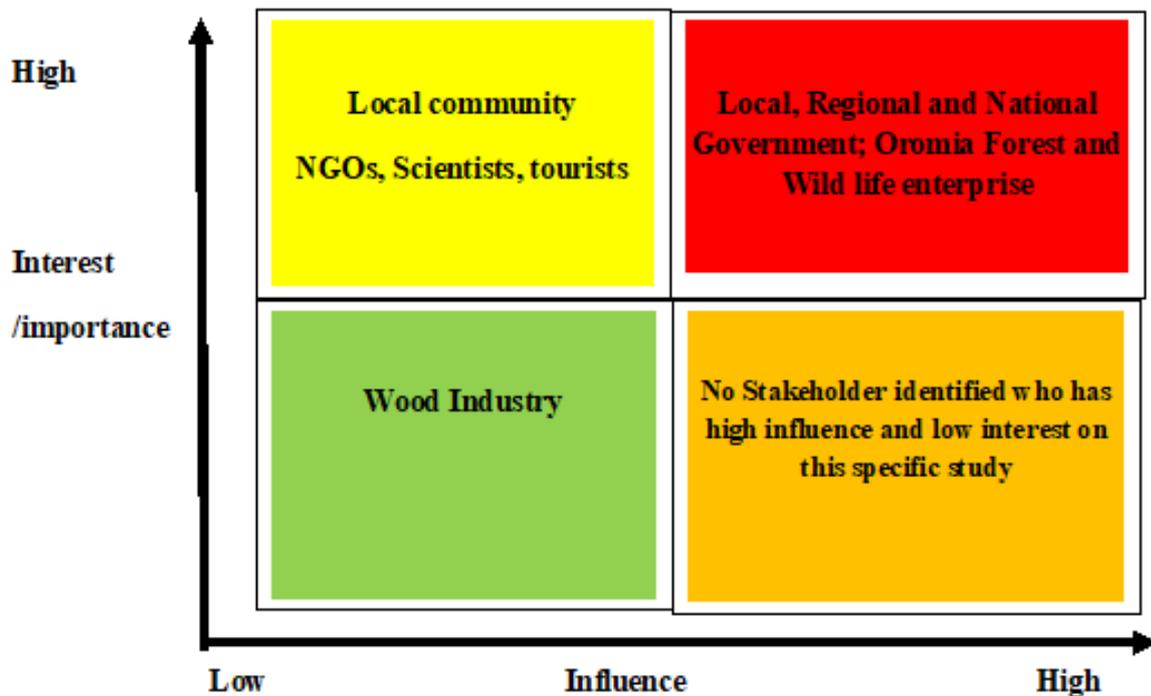
because their mandate is profit making from wood processing and manufacturing of furniture. In addition, they have no decision-making power regarding to the forest.

**3. 3. 1. 3. Analysis of Stakeholder Management Capacity**

When we analysis management capacity of all stakeholder stated above, they have different management capacity based on its mandate and responsibilities regarding to Chilmo forest. Local communities are the first and foremost responsible stakeholder for management of Chilmo forest due to their proximity to the natural resources and livelihood dependence. But they may not have power to protect others. Forest cooperatives together with Oromia forest and wildlife enterprise play a leading role for overall management of the forest. However stakeholders from national to local level have strong commitment and mandate to impose access of restriction on the Chilmo forest.

**3. 3. 2. Stakeholder’s importance/influence matrix**

The stakeholder influence matrix (Figure 3) was created after we identified, prioritized and assessed nine main stakeholders based on their interest and influence toward forest ecosystem services provided by Chilmo forest. Most of these stakeholders are local who are directly and indirectly benefit from forest ecosystem services. Based on the stakeholder influence matrix from identified stakeholders’ local communities, NGOs, scientists and tourists have high interest in the use of ecosystem services. Local communities are strongly dependent on forest ecosystem services since Chilmo forest are the main sources of their livelihood.



**Figure 3.** Stakeholder importance/ influence matrix

However, all the above stakeholders don't have any influence to sustain ecosystem services for the long run. Stakeholder such as local, regional and national government together with Oromia forest and wildlife enterprise have a positive influence and decision-making power toward sustainable management of ecosystem services. Stakeholders like wood industry has no any influence and interest regarding to sustainable management of Chilmo forest even if they got raw material from the forest. Even though the identified stakeholders are a stake for sustainable management and conservation of Chilmo forest, mainstreaming between them is lacking which is more significant to reduce redundancy of efforts and money. Therefore, sustainable conservation and management can be secured with full participation and responsibilities of all interested stakeholder.

#### **4. CONCLUSIONS**

Forest ecosystem services provide both tangible and intangible benefits for local communities and for the country as a whole. The contribution of Chilmo forest as a means of livelihood is not very well studied and appreciated by local people found in the study area. Local people are involved in number of activities but regarding income and source of livelihood forest constitutes more than a third of annual average income of the surveyed household followed by crop production and livestock respectively. However, some tangible benefits for example wild fruit, medicinal plant and many of other intangible services such as carbon sequestration potential of Chilmo forest, the contribution of pollinators for agricultural production and so on are not included in this study which actually underestimates economic value of forest as a whole. So, understanding the tangible and intangible value of natural resources would contribute more toward better conservation and management of the natural resources.

The findings disclosed that local communities are highly dependent on forests' ecosystem services. The research results will be used for awareness creation and that will have great implication to change the attitude of the stakeholder toward sustainable conservation and management of the forest. Overall the research objectives are achieved and findings will be addressed and have a significant contribution toward sustainable use and management of natural resources in the study area and will be uses as an input for further valuation study.

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